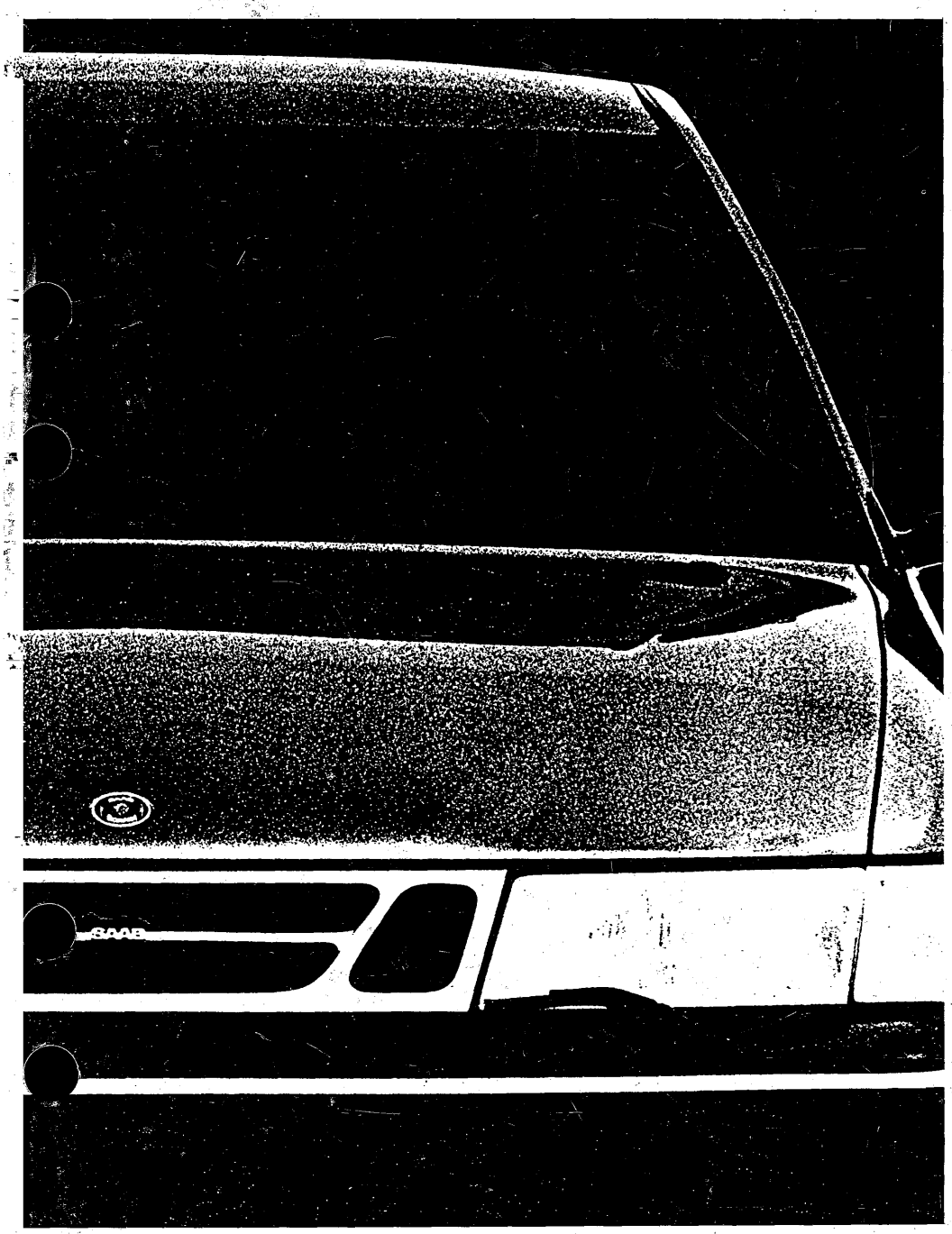
Saab 9000

Service Manual



M 1995

ENG

3:5 Programmable EDU trip computer

Saab 9000

SERVICE MANUAL

3:5 Programmable EDU trip computer

M 1995–

Preface

From year model 1995 the fault diagnosis of the programmable EDU trip computer with ISAT has been changed. All diagnosis is now presented in clear text. Methods for adjustment with the help of ISAT have also been changed.

All information and illustrations in this Service Manual are based on the design of the cars at the time of the final editing of the manuals. Choice of models, technical data and equipment vary from one market to another and may be changed without prior notice.

Saab Automobile AB

Warning, Important and Note

The headings "Warning", "Important" and "Note" occur from time to time in the Service Manual. They are used to draw the attention of the reader to information of special interest and seriousness. The importance of the information is indicated by the three different headings and the difference between them is explained below.

⚠ WARNING

Warns of the risk of material damage and grave injury to mechanics and the driver, as well as serious damage to the car.

Important

Points out the risk of minor damage to the car and also warns the mechanic of difficulties and time-wasting mistakes.

Note

Hints and tips on how the work can be done in a way that saves time and labour. This information is not supplied for reasons of safety.

Market codes

The codes refer to market specifications

AT	Austria	GB	Great Britain
AU	Australia	GR	Greece
BE	Belgium	IS	Iceland
CA	Canada	IT	Italy
CH	Switzerland	JP	Japan
DE	Germany	ME	Middle East
DK	Denmark	NL	Netherlands
ES	Spain	NO	Norway
EU	Europe	SE	Sweden
FE	Far East	US	USA
FI	Finland	UC	US California
FR	France		

Production: Service Support, Saab Automobile AB, Trollhättan, Sweden

Safety instructions

⚠ WARNING - RISK OF FIRE

In spite of the system voltage being only 12 V, the large battery capacity could cause burns or fire in the car. A short circuit could result in very high currents.

⚠ WARNING - HIGH VOLTAGE

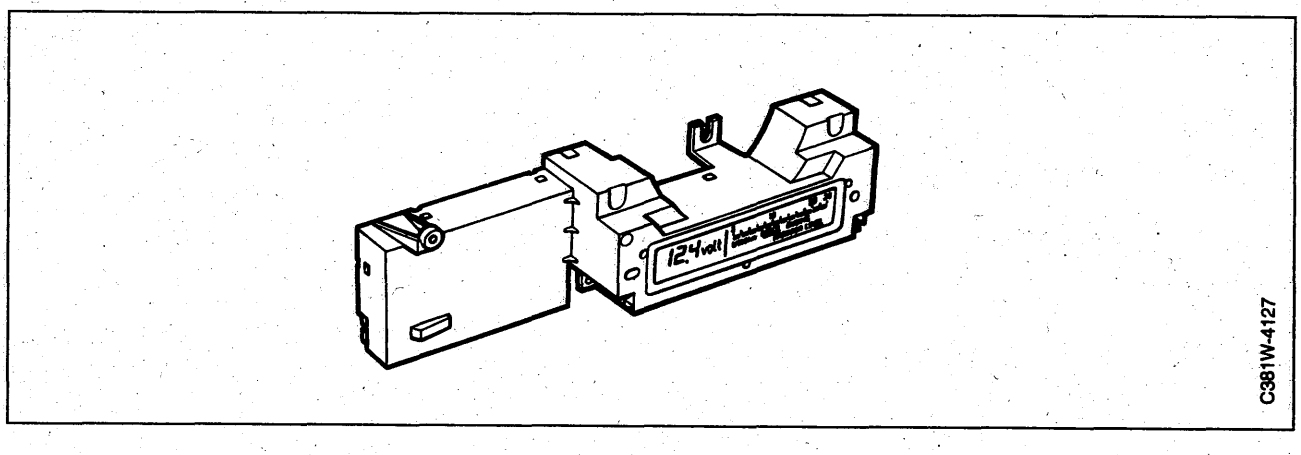
The electronic ignition system generates voltages in excess of 48,000 volts.

This voltage can be fatal to people with a weak heart or to anyone with a pacemaker. Treat the ignition with great respect.

Before starting work on the electrical system:

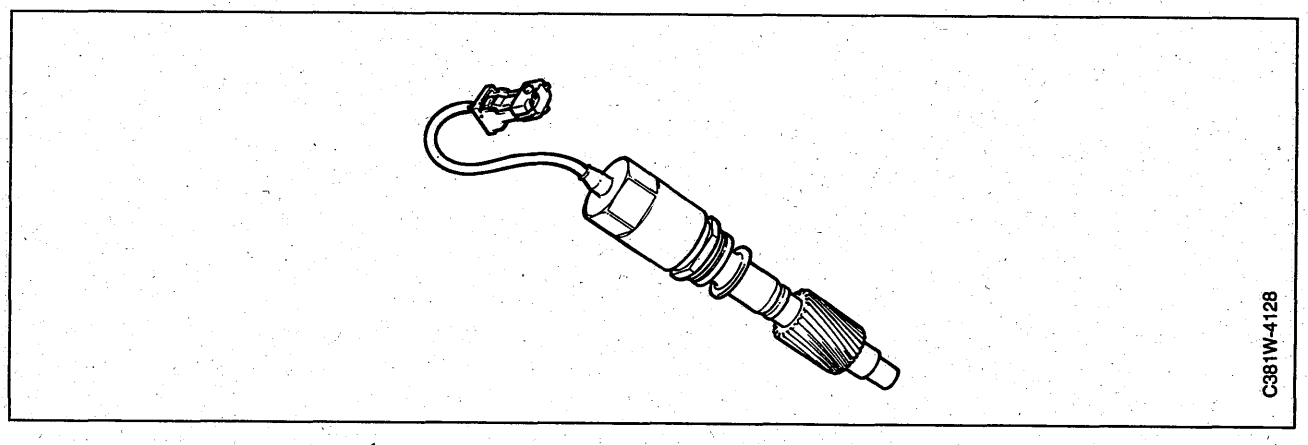
- remove wrist-watch and rings.
- disconnect one battery terminal when electrical components are to be removed. Always follow the instructions in the appropriate Service Manuals.

Technical data



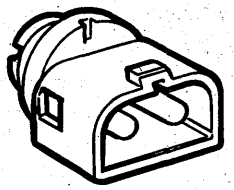
EDU control module

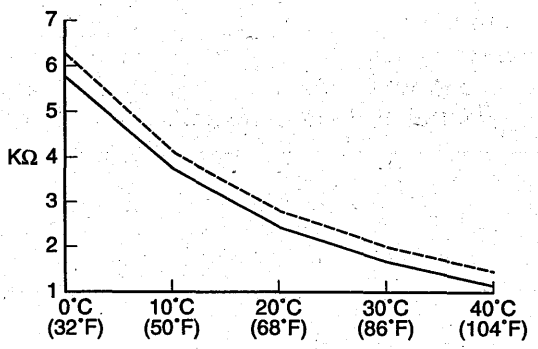
Number of pins		39
Voltage supply +30	pin No.	1
Voltage supply +15	pin No.	37
Power ground	pin No.	21



Vehicle speed sensor

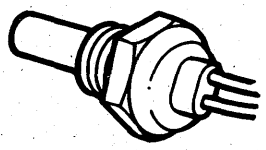
Coil resistance	Ohms	380 ± 20%

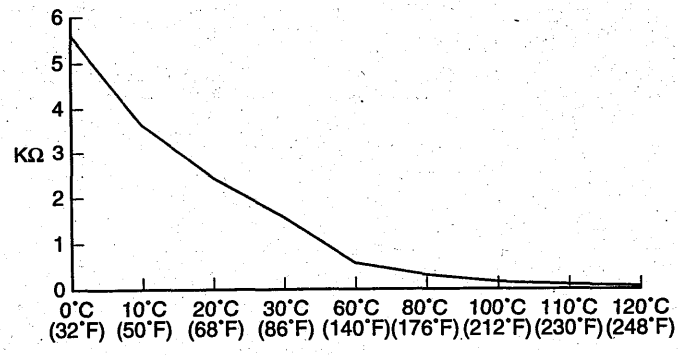




Outside temperature sensor

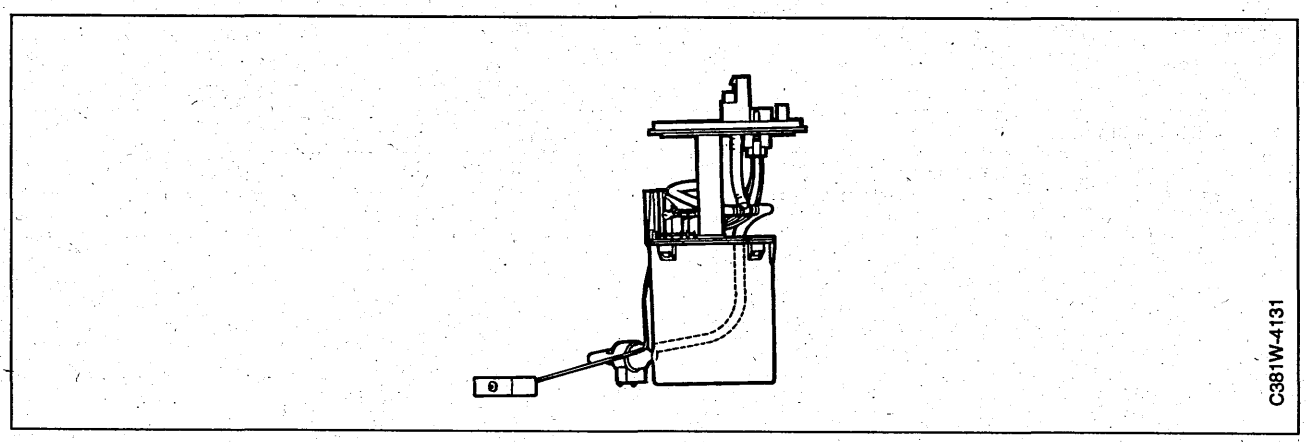
Resistance at temperature 0°C (32°F)	kOhms	5,8 - 6,2
10°C (50°F)	kOhms	3,8 - 4,1
20°C (68°F)	kOhms	2,5 - 2,8
30°C (86°F)	kOhms	1,7 - 1,9
40°C (104°F)	kOhms	1,2 - 1,4





Engine coolant temperature sensor

Resistance at temperature 0°C (32°F)	kOhms	5,7
10°C (50°F)	kOhms	3,7
20°C (68°F)	kOhms	2,4
30°C (86°F)	kOhms	1,6
60°C (140°F)	Ohms	570
80°C (176°F)	Ohms	300
100°C (212°F)	Ohms	180
110°C (230°F)	Ohms	140
120°C (248°F)	Ohms	110



Fuel level sensor

Resistance	Ohms	25 - 370

Radiator fan

Step 1

		4 cylinders	6 cylinders
Ignition on, fan starts at	°C (°F)	100 (212)	97 (207)
stops at	°C (°F)	96 (205)	93 (199)

After-running

Ignition off, fan starts at	°C (°F)	103 (217) for both 4 and 6 cylinders
stops at	°C (°F)	<107 (225) after 0.5 min. after-running >107 (225) after 0.5 min. makes the fan run for a further 3 minutes

Step 2

		4 cylinders	6 cylinders
Fan starts at	°C (°F)	111 (232)	108 (226)
Fan stops at	°C (°F)	107 (225)	104 (219)

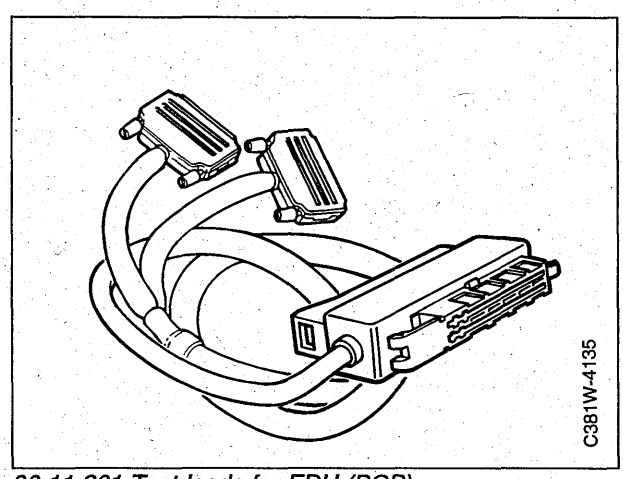
A/C switching on and off

		4 cylinders	6 cylinders
A/C switched off at	°C (°F)	119 (246)	116 (241)
on at	°C (°F)	118 (244)	115 (239)

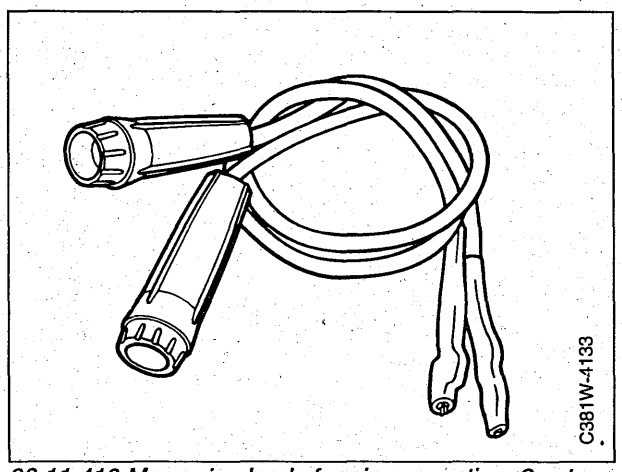
Temperature display

		4 cylinders	6 cylinders
Horizontal position at	°C (°F)	80 (176)	77 (171)
Leaves horizontal position at	°C (°F)	113 (235)	110 (230)
Enters red area at	°C (°F)	121,5 (250,7)	118,5 (245)

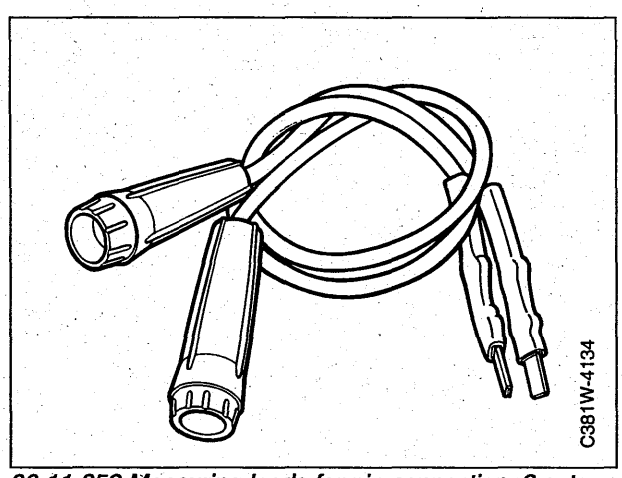
Special tools



86 11 261 Test leads for EDU (BOB)



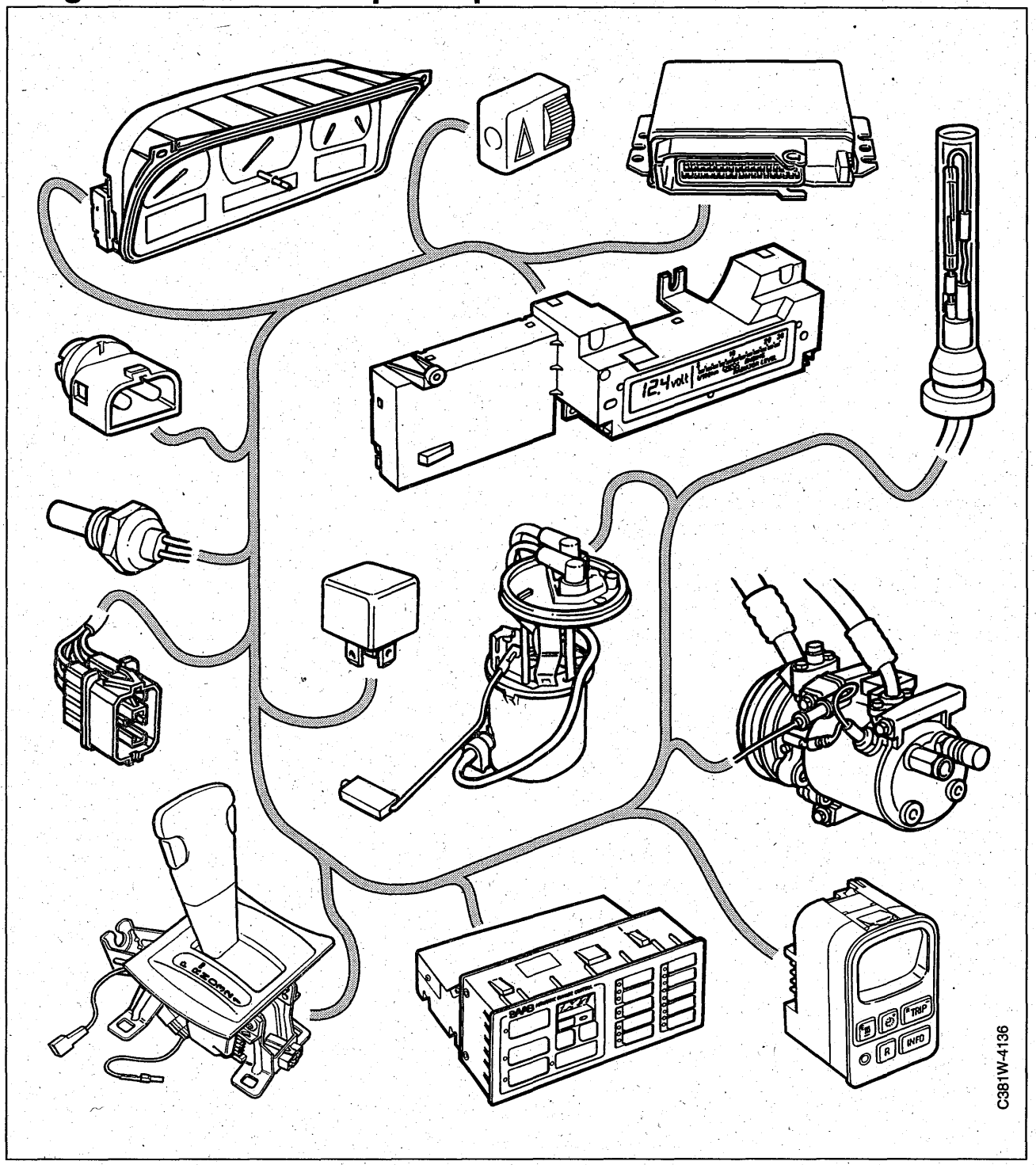
86 11 410 Measuring leads for pin connection, 2 sets (4 female pins)



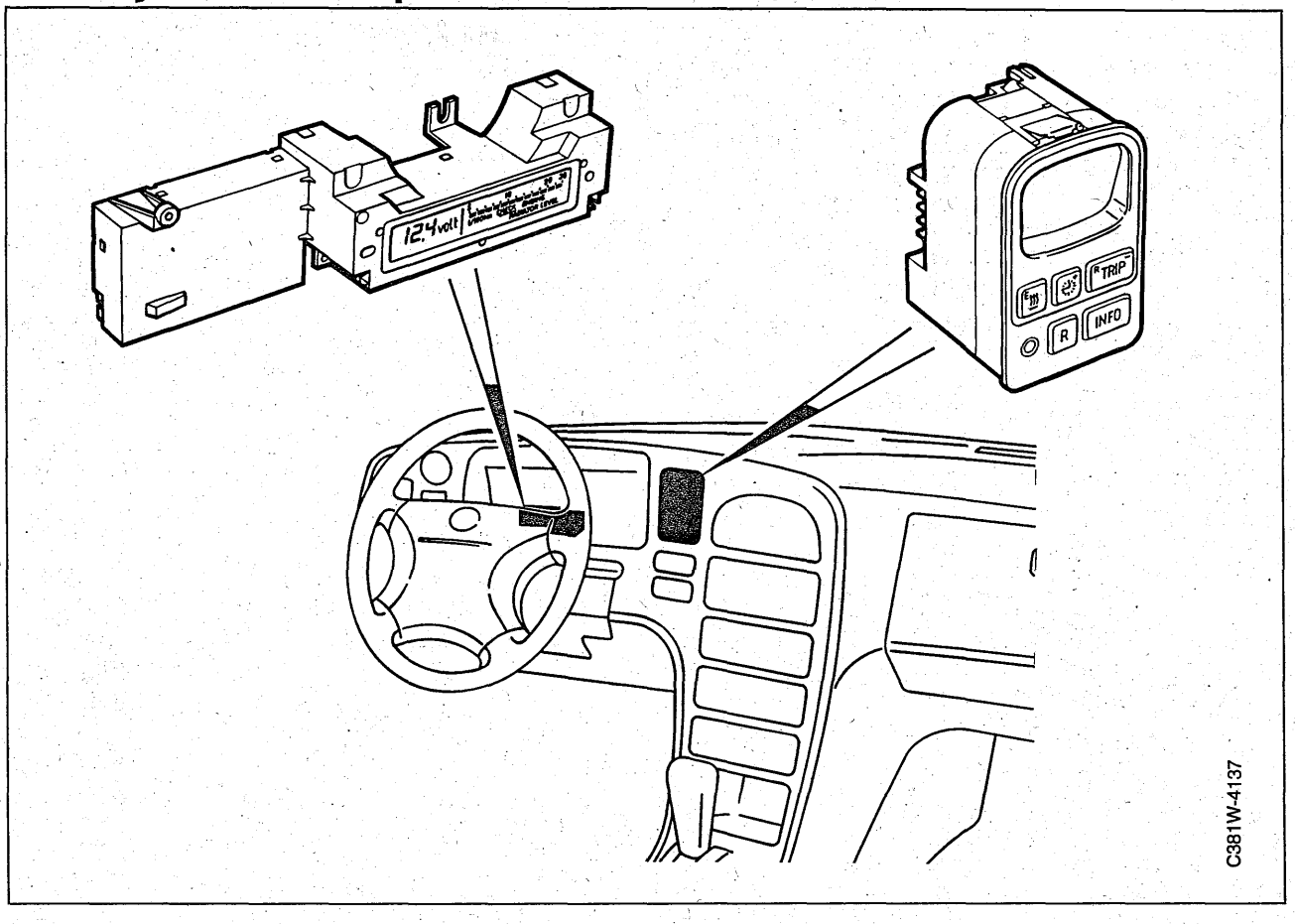
86 11 352 Measuring leads for pin connection, 2 sets (4 male pins)

Technical description

Programmable EDU trip computer



EDU system description



The EDU trip computer has a different number of functions depending on the car's level of equipment and in which model it has been installed. There are two basic designs; EDU 3M for cars with manual gearbox and EDU 3A for cars with automatic transmission.

The trip computer has a set of buttons under the clock/SCC and a display under the speedometer which gives information about:

- Average fuel consumption
- Current fuel consumption
- Range possible on the fuel remaining in the tank
- Outside temperature
- Battery voltage

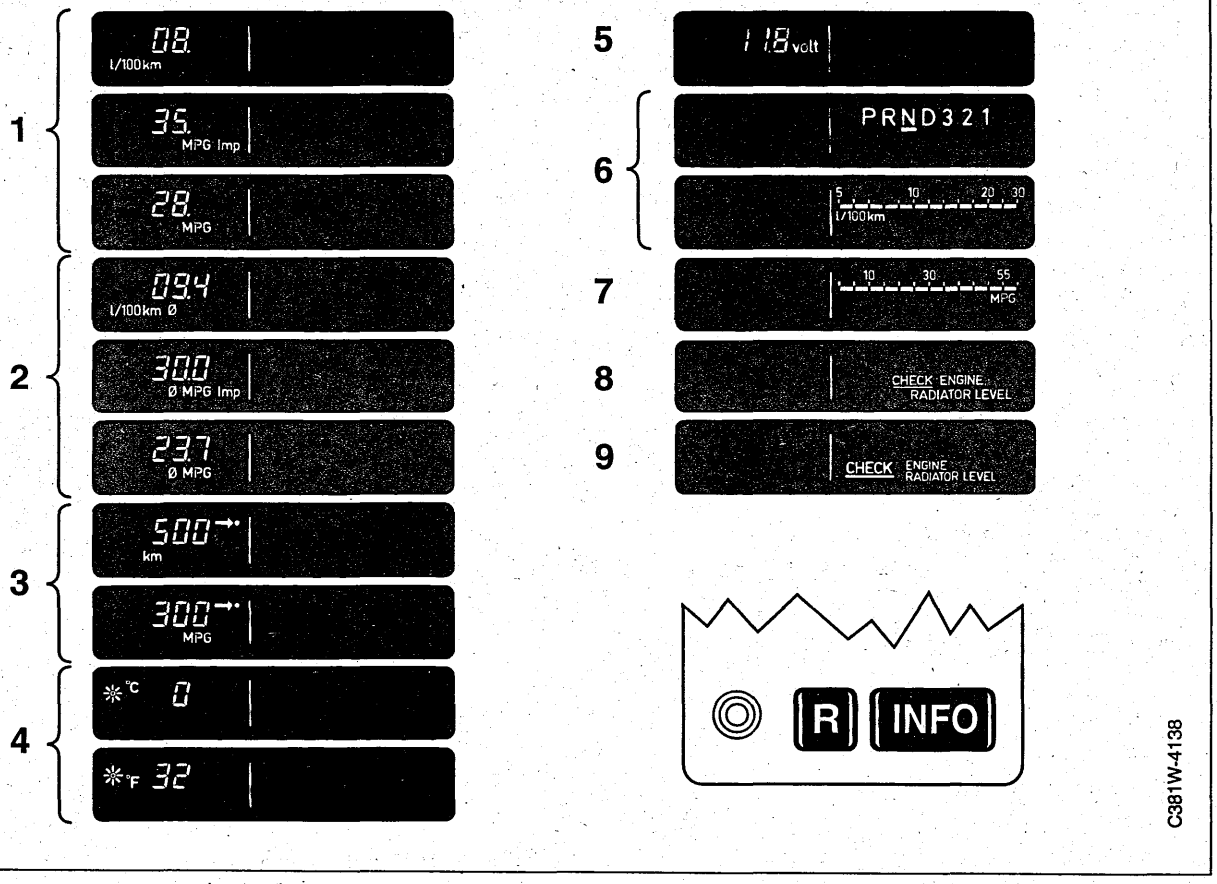
This information is shown in the left-hand part of the display under the speedometer. The information is changed by repeatedly pressing the INFO button.

The following is shown in the right-hand part of the display:

- CHECK ENGINE
- CHECK RADIATOR LEVEL

These warnings are displayed automatically. When the ignition is switched on, all these warnings should light and the go out, one at a time, within 4 seconds.

Displays



Left-hand displays

1. Current fuel consumption (EDU 3A)
- l/100 km
- MPG Imp (Miles Per Gallon), Imp=Imperial
- MPG (Miles Per Gallon)

2. Average fuel consumption
- l/100 km
- MPG Imp (Miles Per Gallon), Imp=Imperial
- MPG (Miles Per Gallon)

3. Range with remaining fuel
- km
- Mi

4. Outside temperature
- °C
- °F

5. Battery voltage
- volts

Right-hand displays

6. Gear position indicator (EDU 3A)

7. Current fuel consumption (EDU 3M)
- l/100 km
- MPG

8. CHECK functions — EDU 3M

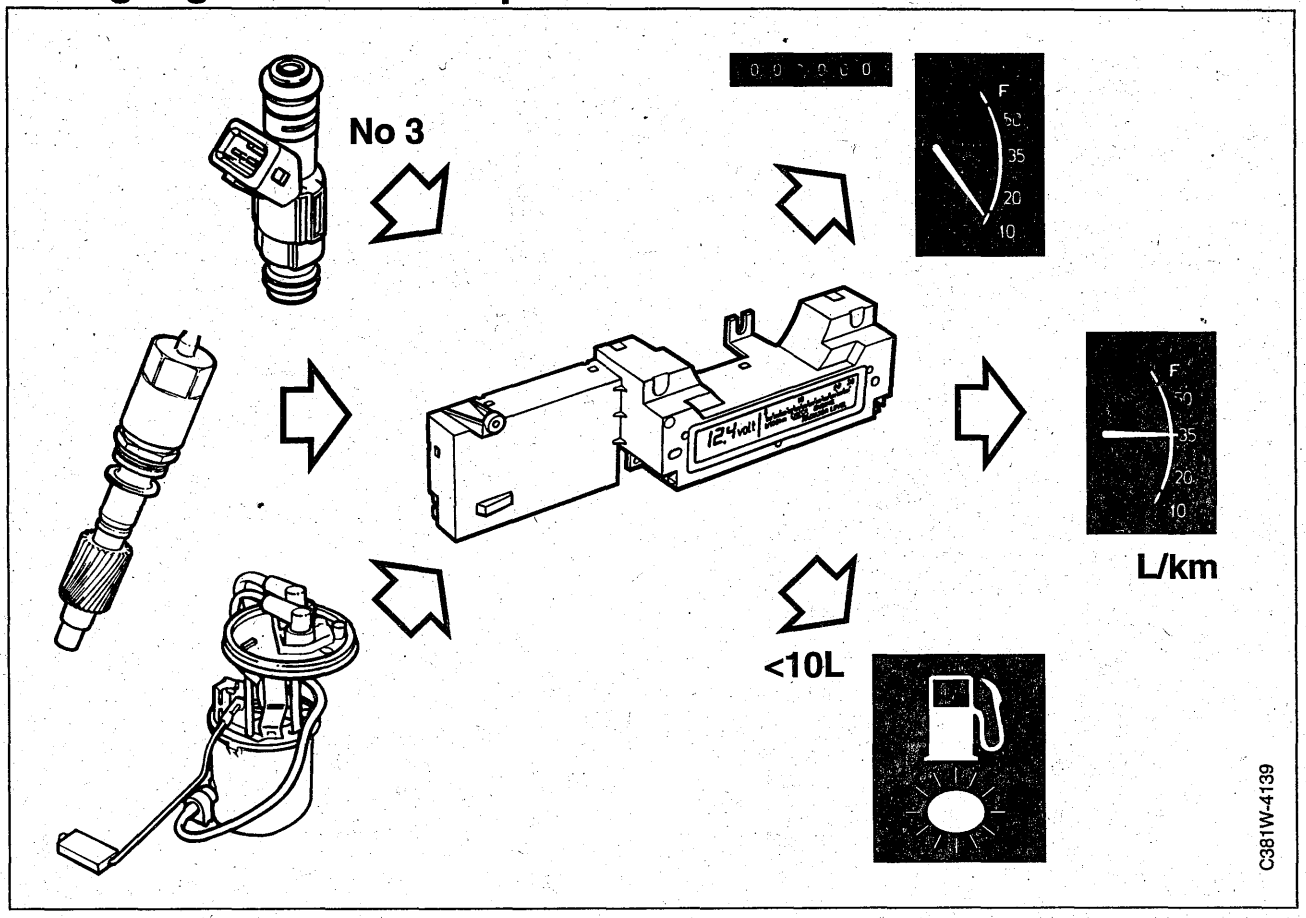
9. CHECK functions — EDU 3A

Changing units

To change the units displayed, hold the INFO and R buttons depressed for at least 4 seconds. Each time they are depressed, one of the following four groups is selected:

- liter/100km, kilometer, °C
- MPG (American), miles, °F
- MPG (English), miles, °F
- MPG (English), miles, °C

Fuel gauge/fuel consumption



Using information about the quantity of fuel in the tank, injector open times and the speed of the car, the EDU control module calculates the current and average fuel consumption and the range with remaining fuel.

Fuel level gauge

The EDU control module receives information about the remaining quantity of fuel from the fuel level sensor in the tank. Using this information, the control module controls the fuel gauge and the fuel warning lamp, which lights when the quantity of fuel in the tank goes below 10 l.

Fuel consumption

To calculate the current and average fuel consumption, the control module requires information about both the quantity of fuel injected and the distance driven.

The control module gets the quantity of fuel injected by measuring the pulse length of the injectors. If the car is equipped with Motronic, the EDU control module is linked by a lead to the 3rd injector. If the car is equipped with Trionic, the signal comes directly from the Trionic control module.

The control module calculates speed by measuring the pulse frequency from the speedometer.

Current fuel consumption

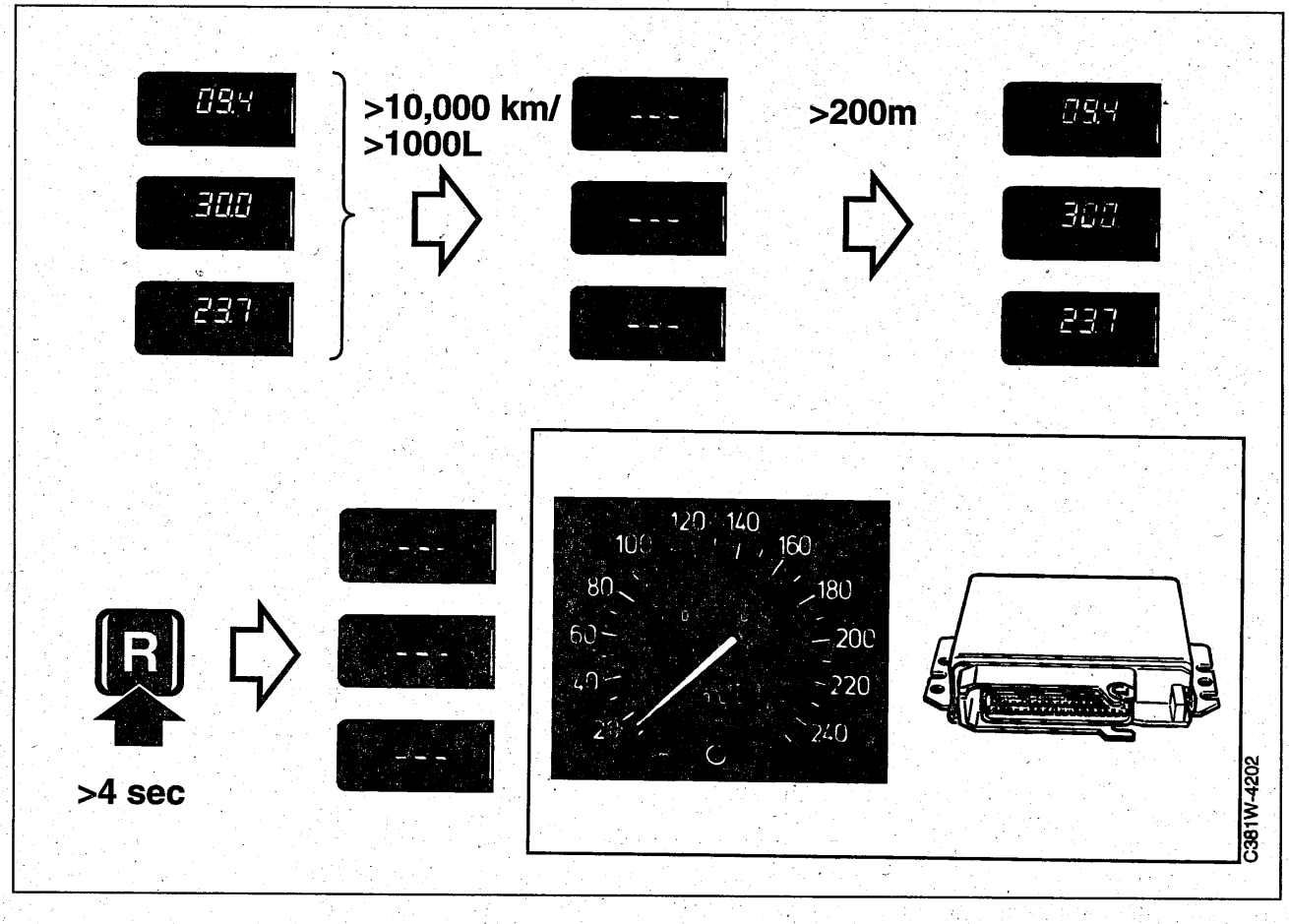
Current fuel consumption is calculated over a distance of about 10 meters.

On cars with a manual gearbox a bar indicator across the right-hand display shows the current fuel consumption.

Average fuel consumption

The average fuel consumption is calculated over the distance the vehicle has covered since the counters for "total distance covered" and "total fuel consumption" were last zeroed (R button pressed for more than 4 seconds). The display range is 0 to 99.9 liters/100 km, MPG Imp or MPG.

Counters for distance covered and fuel consumed



So that the control module can calculate the average fuel consumption and the range possible on remaining fuel, it has two counters; one for "total covered" distance (max. 10,000 km) and one for "total consumption" of fuel (max. 1,000 l).

Manual zeroing

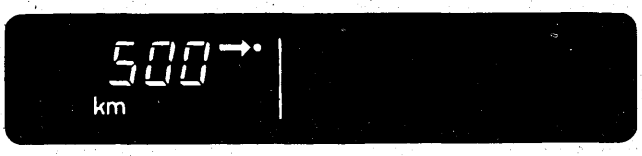
Both the counters can be manually zeroed by holding the R button pressed for at least 4 seconds.

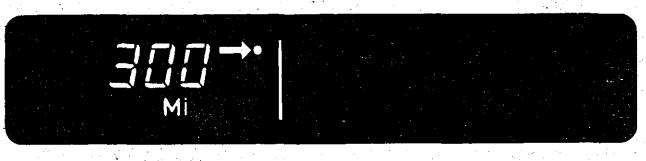
Automatic zeroing

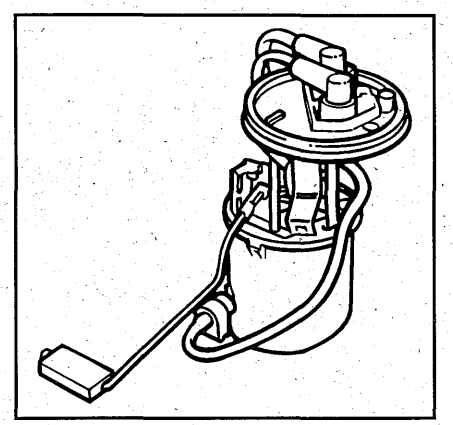
When either of the counters reaches maximum value, both counters are automatically zeroed.

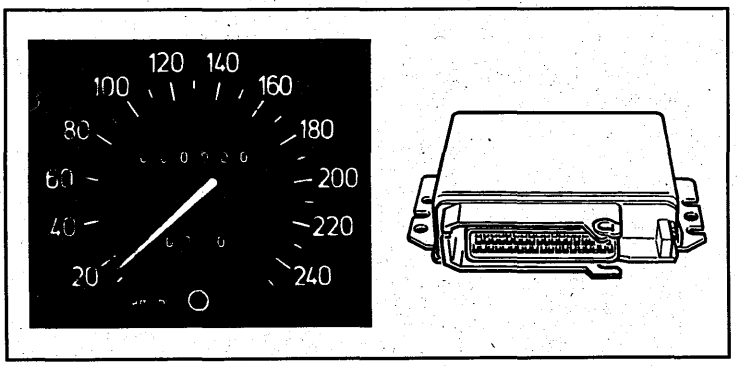
After zeroing, "---" is displayed for the first 200 meters.

Range with remaining fuel







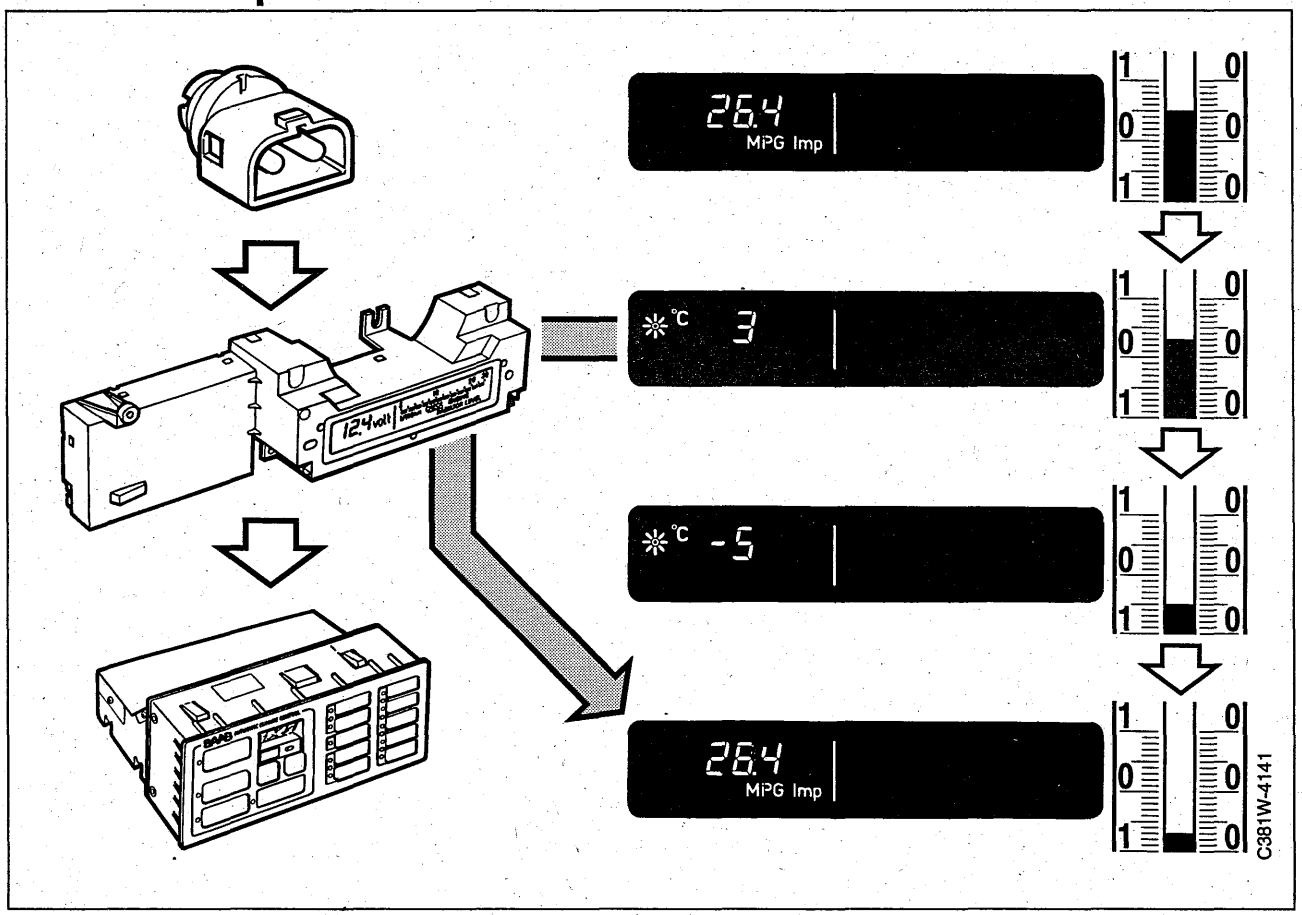


To calculate how far the car can be driven with the quantity of fuel remaining in the tank, the control module uses both information on the quantity of fuel in the tank and the average fuel consumption during the last 20 minutes.

When the range function is selected, the range arrow lights and the range is displayed between 0 and 999 km or miles.

If some other function is selected for display and the range goes below 50 km or 30 miles, the range arrow starts to flash.

Outside temperature



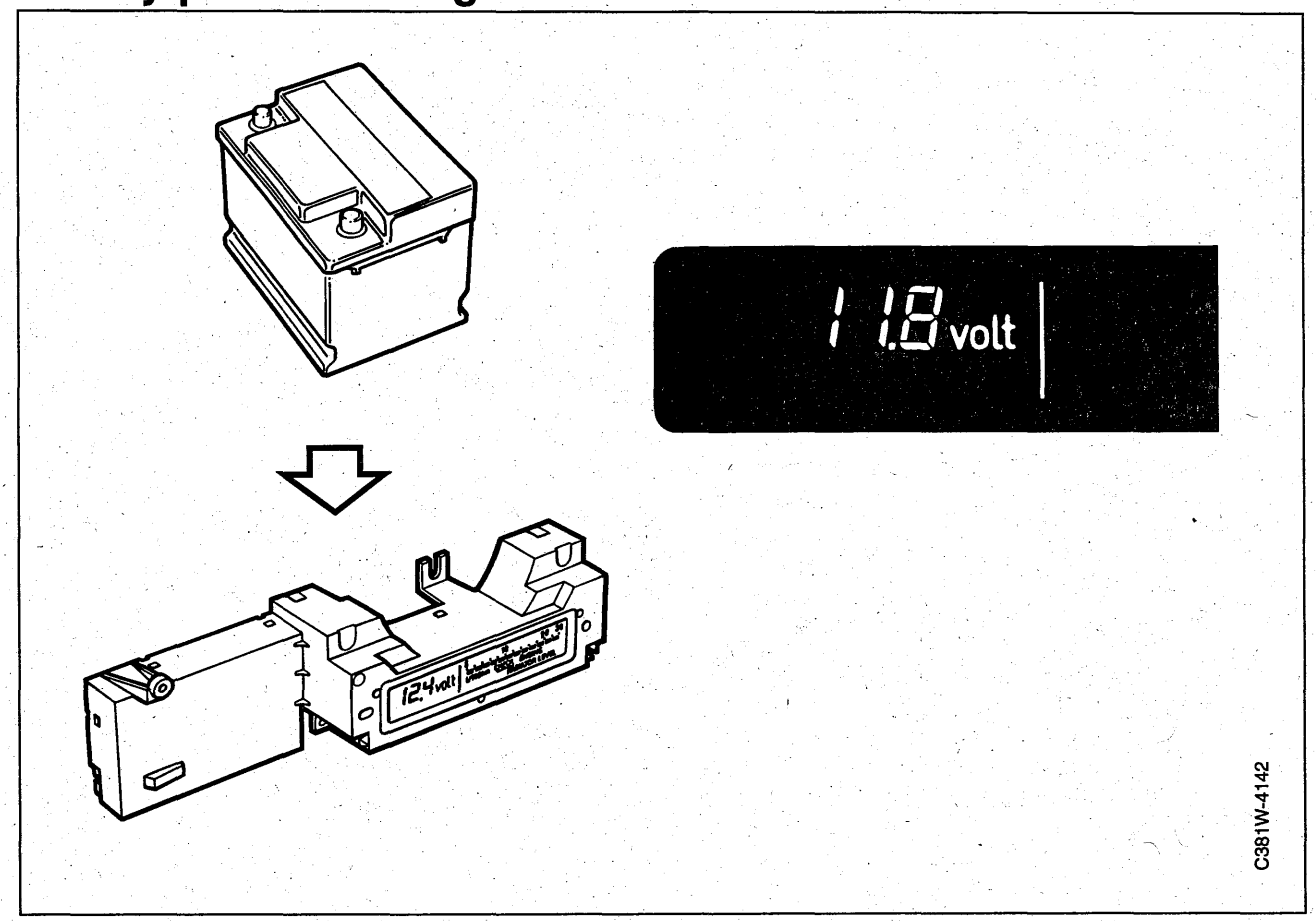
The outside temperature sensor consists of an NTC resistor across which the resistance varies with temperature. The control module registers the outside temperature by measuring the thermistor resistance.

If the outside temperature drops from a higher temperature down to 3 °C (37 °F) or rises from a lower temperature to -3 °C (26 °F), the outside temperature will automatically be shown on the display irrespective of which display the EDU control module is set to.

This display remains until the outside temperature leaves the range of -6 °C (43 °F) to 6 °C (21 °F) or until another function is selected by pressing the INFO button.

The EDU control module then sends a temperature signal to the ACC control module.

Battery positive voltage indication



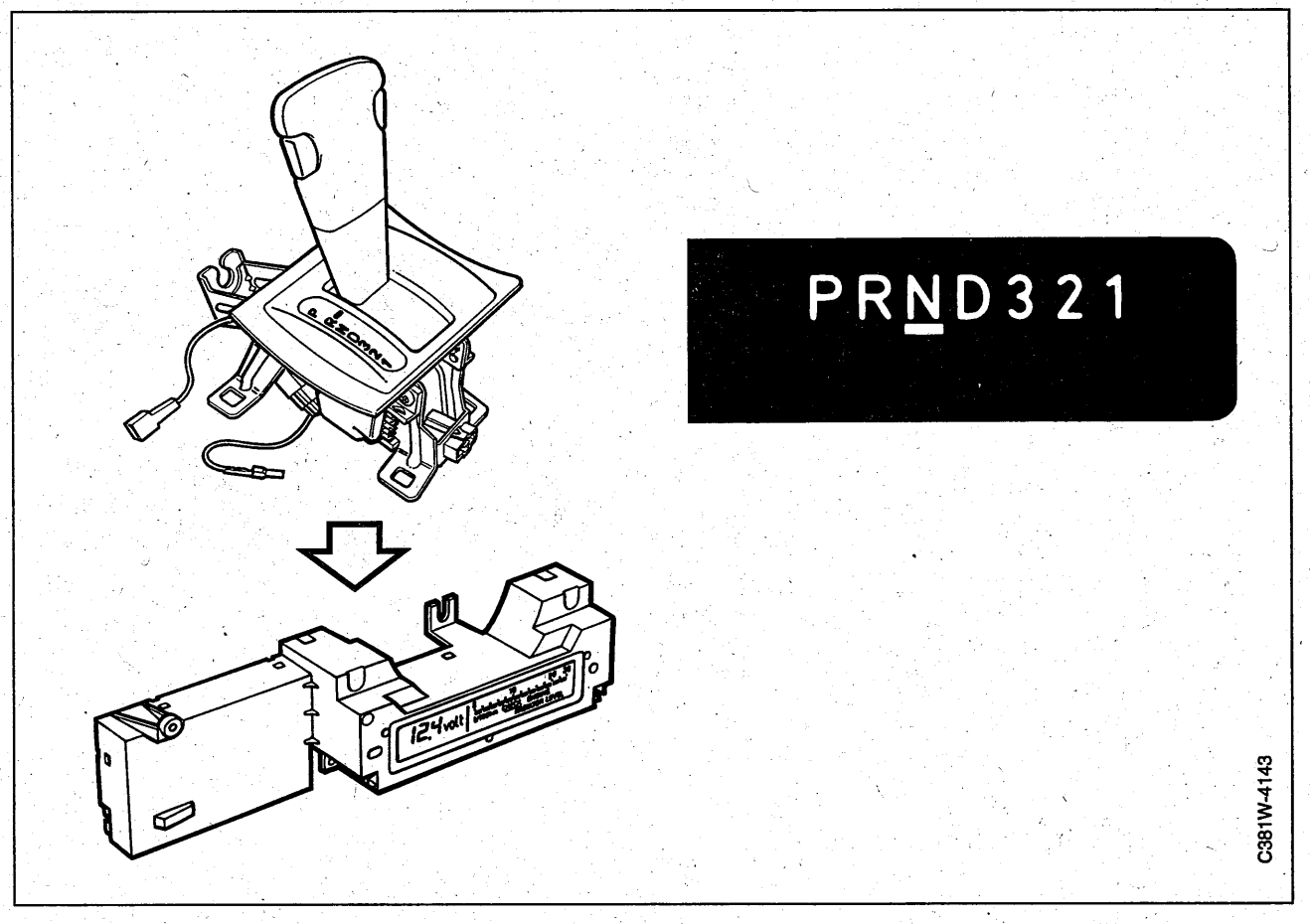
To show the battery positive voltage on the display, the EDU control module registers the voltage from the ignition switch +15 lead at 1 second intervals.

The EDU control module measuring range is 7.5 to 16 V.

When the engine is started, the battery positive voltage is shown on the display. The value displayed is the lowest voltage measured while the starter motor is turning the engine.

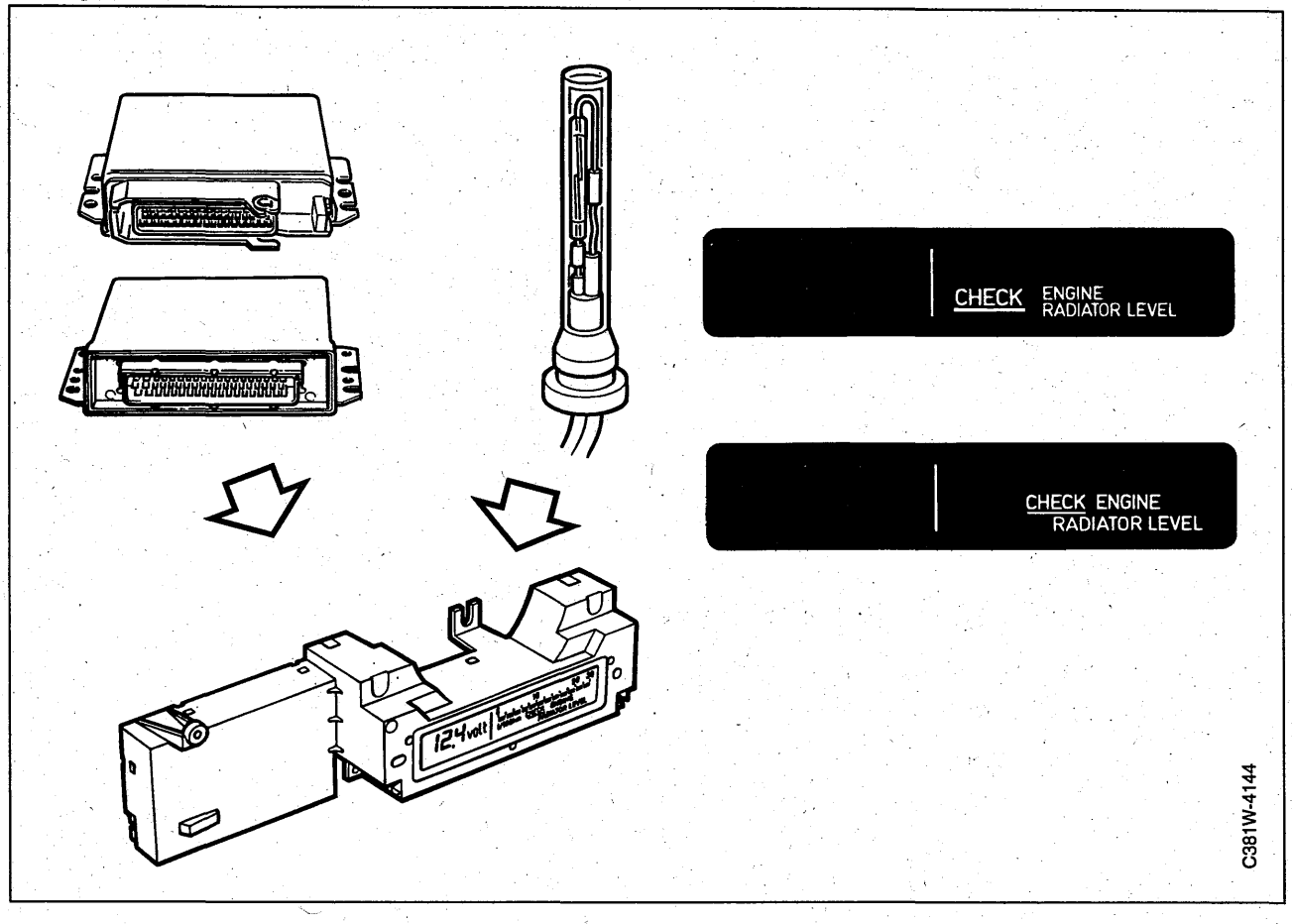
When the car has travelled 10 to 15 meters, the display reverts to the previously selected mode.

Gear selection indication



On cars with automatic transmission, the display shows the selected gear position with a line under each gear symbol. The control module gets information on the current gear position from the transmission range switch.

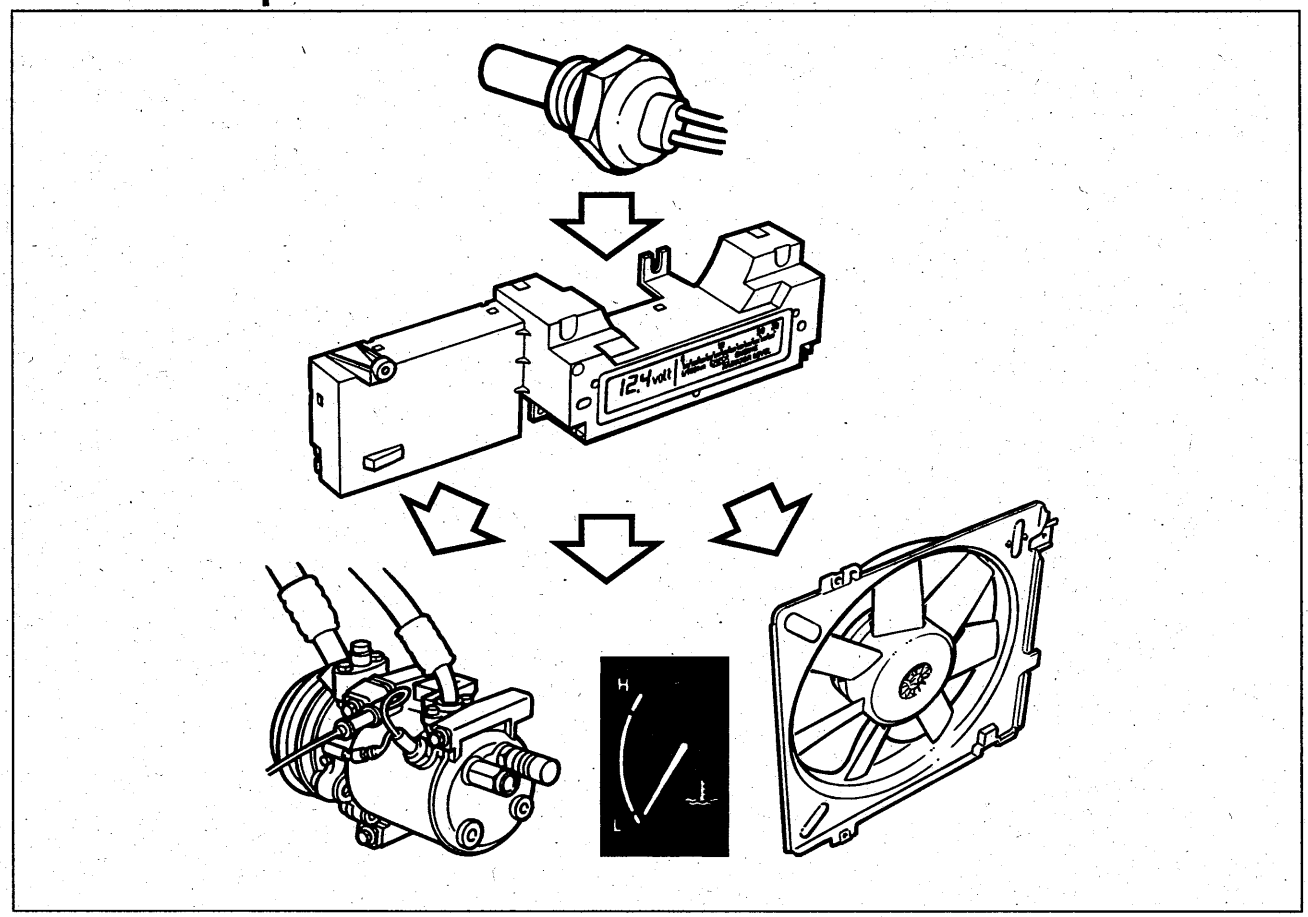
CHECK functions



The CHECK functions display gives the following warnings with maximum light strength when each condition arises.

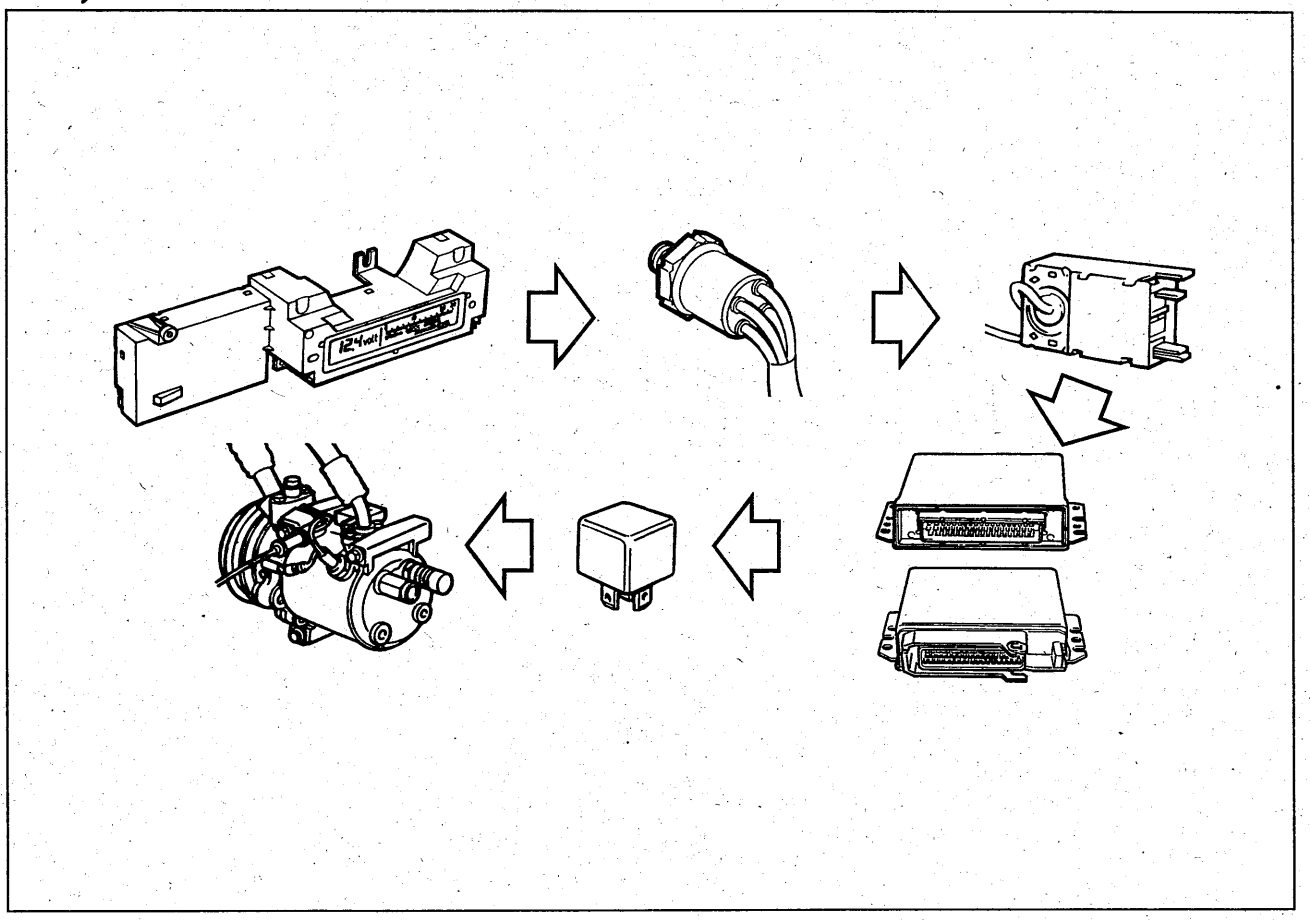
- CHECK ENGINE when the engine management system (Trionic/Motronic) control module registers a fault.
- CHECK RADIATOR when the EDU control module receives information from the coolant level sensor that indicates a low coolant level.

Coolant temperature



The engine coolant temperature sensor, which is an NTC resistor, is linked to the EDU control module. The control module calculates the coolant temperature from the resistance over the resistor. The control module uses this information to control steps 1 and 2 of the radiator fan, disconnect the A/C compressor at high engine temperatures and control the display on the engine temperature gauge.

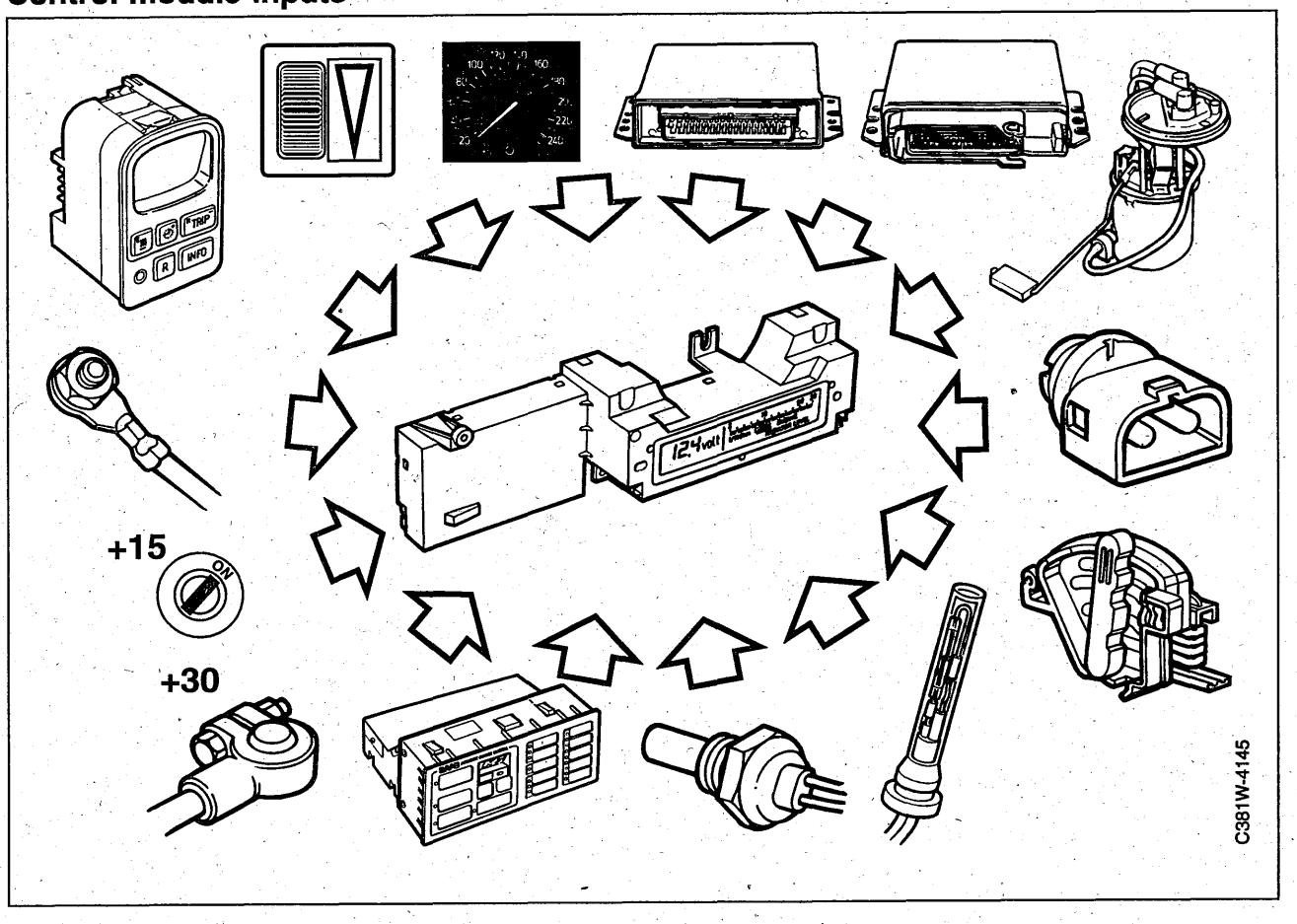
A/C, disconnection



When the ACC compressor is to be activated, the EDU control module is supplied with voltage from the ACC / A/C switch. The control module registers the engine temperature and at engine temperatures lower than those specified for A/C disconnection, the EDU control module feeds the voltage on via a pressure switch and an anti-freeze thermostat which is connected to the Trionic/Motronic control module. The engine management system grounds the A/C relay when the condition for A/C connection has been met.

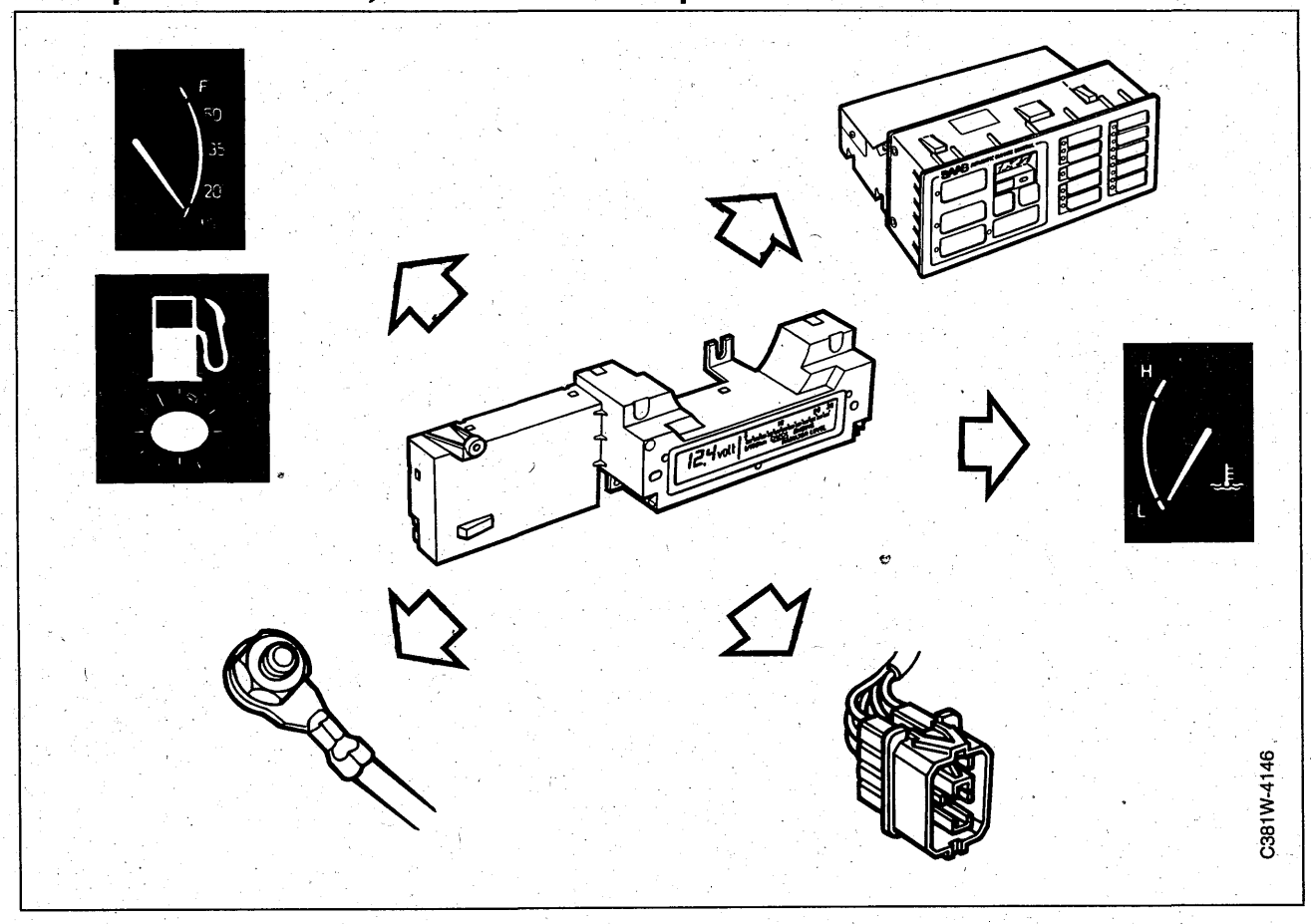
Description of function

Control module inputs



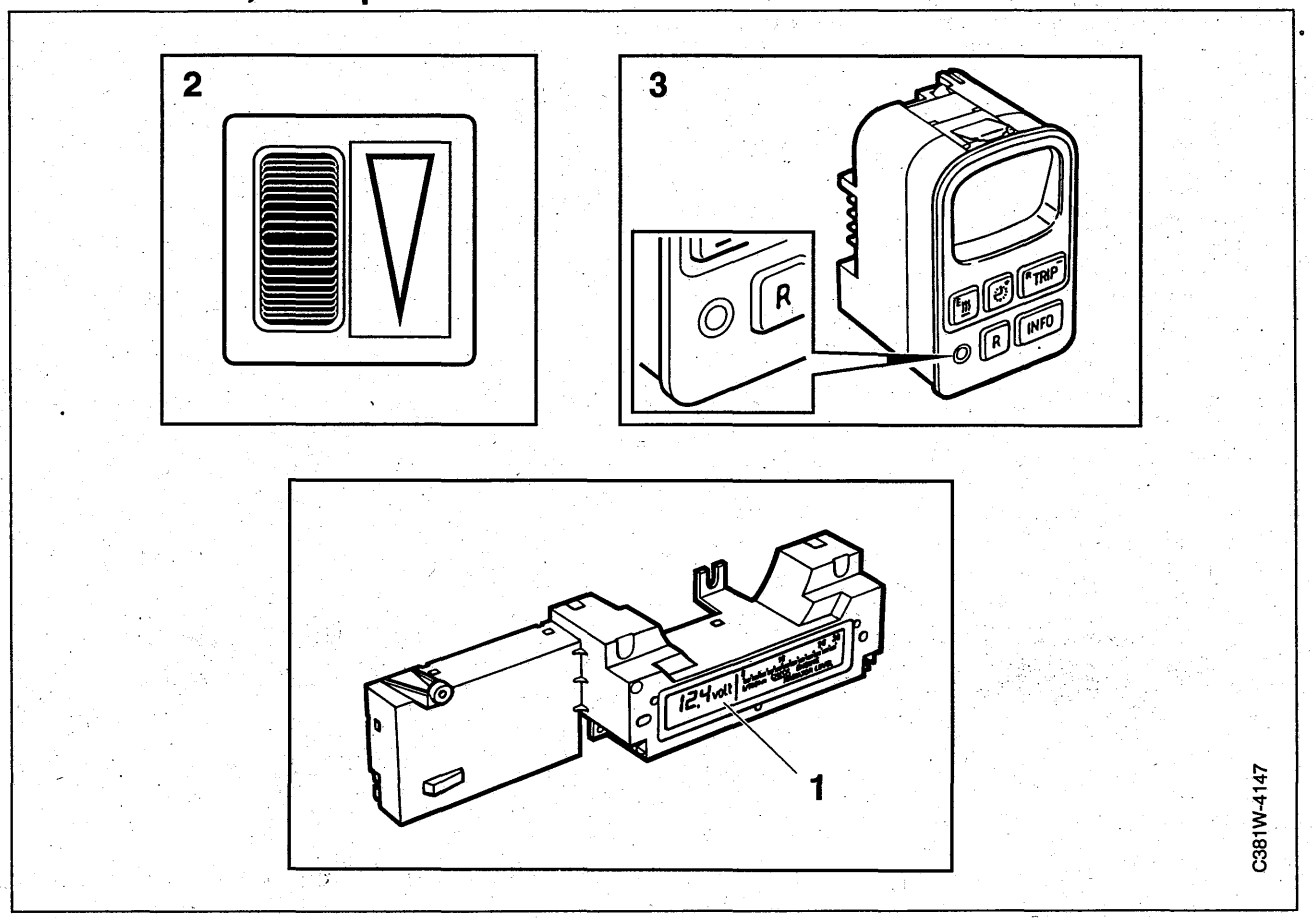
- INFO button (pin 14), see page 26
- R button (pin 15), see page 26
- Light sensor (pin 36), see page 27
- Rheostat (pin 32), se page 27
- Vehicle speed signal (pin 9), see page 28
- Fuel signal (Trionic and Motronic) (pin 8), see page. 29
- Fuel level sensor (pin 33), see page 30
- Outside temperature sensor (pin 35), see page 32
- Transmission range switch (pins 18, 19 and 20), see page 33
- CHECK ENGINE (Trionic and Motronic) (pin 12), see page 34
- Coolant level switch (pin 17), see page 35
- Engine coolant temperature sensor (pin 34), see page 36
- A/C, in (pin 10), see page 38
- Parking heater (pin 3), see page 40
- Scan tool diagnostics (pin 38), see page 25
- Voltage supply +30 (pin 1), see page 24
- Voltage supply +15 (pin 37), see page 24
- Ground (pin 21), see page 24

Description of function, control module outputs



- Fuel gauge (pin 24), see page 42
- Lamp, low fuel level (pin 25), see page 31
- Outside temperature sensor (to ACC unit) (pin 23), see page 41
- Engine temperature sensor (pin 30), see page 42
- A/C, out (pin 4), see page 39
- Radiator fan, low speed, (pin 5), see page 37
- Radiator fan, high speed, (pin 6), see page 37
- Voltage supply combined instrument (engine temperature and fuel sensors), (pin 22), se page 42
- Scan tool diagnostics (pin 38), see page 25
- Ground

Control module, description of function



The EDU 3 programmable trip computer has two versions; version A for cars with automatic transmission and version M for cars with manual gearbox.

Both versions are programmable for different car models.

It is possible to select how the information is presented using the INFO and the R buttons.

The EDU control module can be checked for faults and programmed using the ISAT.

The trip computer is controlled by a central unit (CPU – Central Processing Unit) which is controlled by the EDU program stored in the ROM (Read Only Memory) memory.

- User programming information is stored in EEPROM (Electrically Erasable PROM) and the information remains stored even if the voltage supply is broken.
- EEPROM is also used to store data and diagnostic trouble codes. The information remains in the memory if the voltage drops.

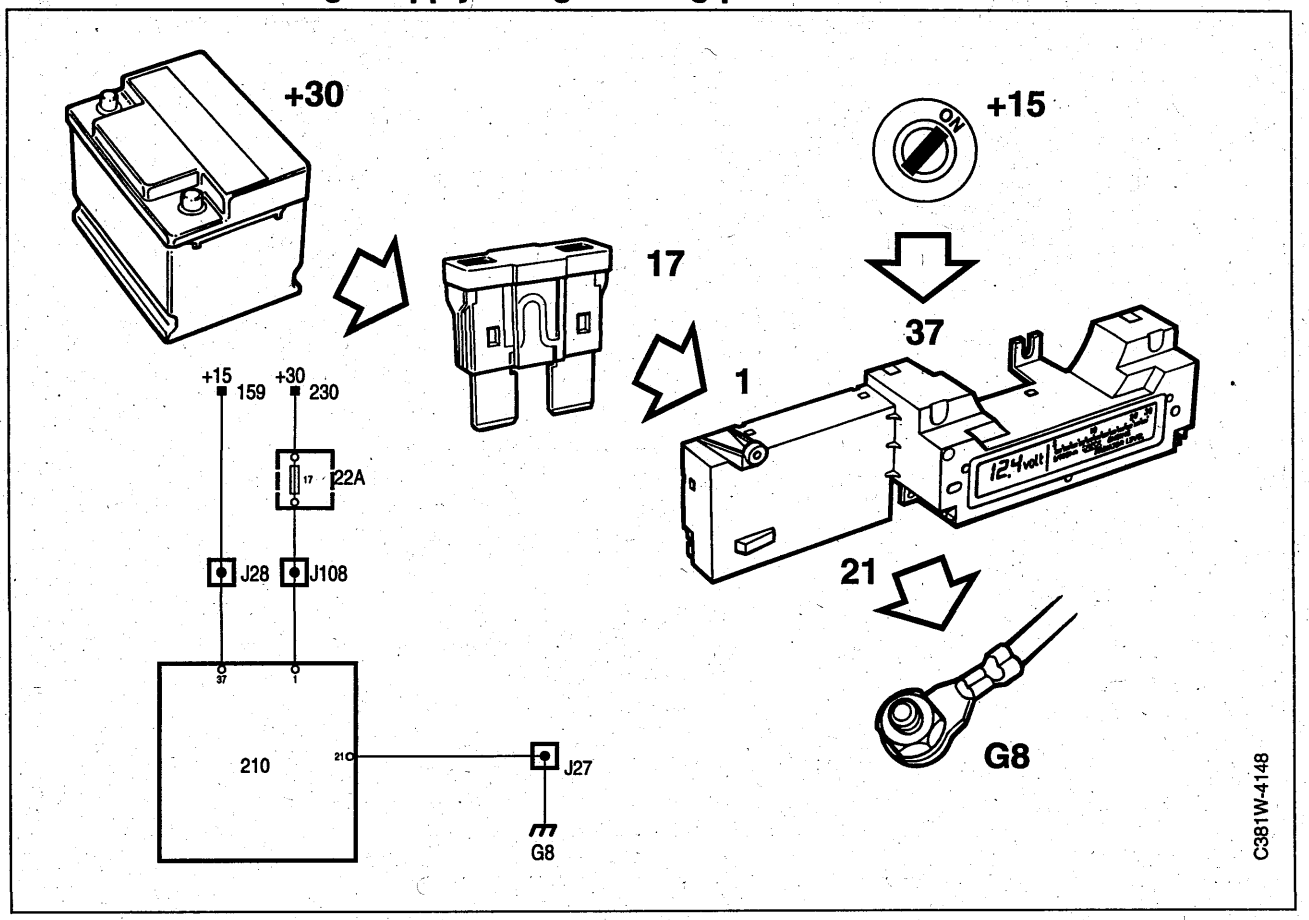
The trip computer is supplied voltage with +30 and +15.

The LCD display is illuminated (1) by three lamps mounted on the rear of the computer.

When driving in the dark, the lighting is controlled by the rheostat (2).

When driving in daylight, light is measured by a light sensor (3) on the SCC unit or on the front of the clock and controls, using this information, the EDU display lighting.

Description of function, control module voltage supply and grounding points



Voltage supply

The EDU control module is supplied voltage from +30 and +15. +30 gives power feed and +15 is used to start the control module.

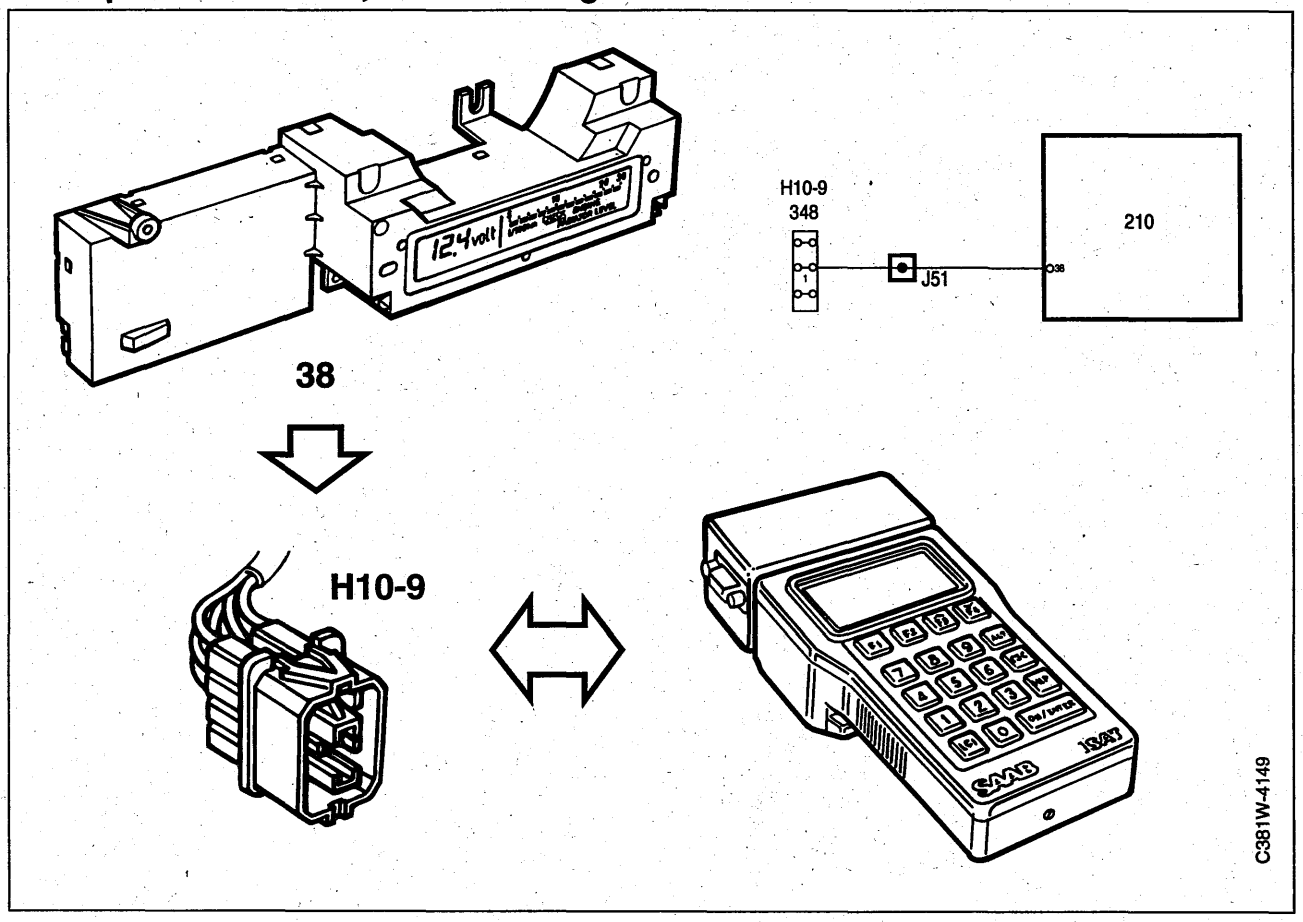
Voltage is fed from +30 via fuse 17 in electrical distribution box 22A to pin 1 on the control module. +15 is fed directly from the +15 distribution terminal to pin 37 on the control module.

The control module works over the range 7.5 - 16 V.

Grounding points

The control module is grounded via pin 21 together with the speed sensor to grounding point G8.

Description of function, scan tool diagnostics

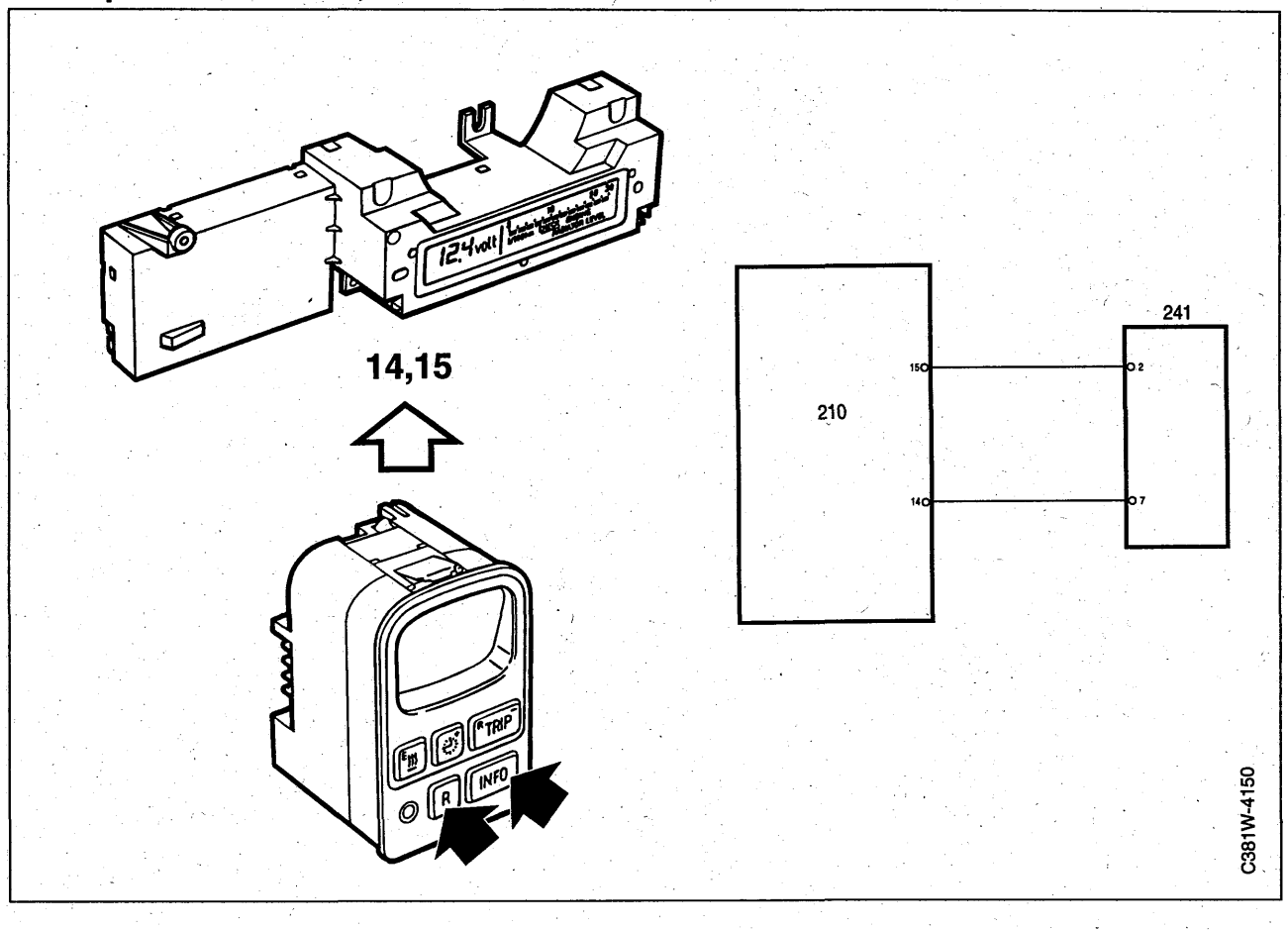


The EDU control module communicates with the ISAT via pin 38. The communication is dual directional and is thus both input and output signal.

For EDU M1995, all scan tool diagnostics is presented in clear text on the ISAT.

The ignition must be on for the ISAT to communicate with the EDU control module.

Description of function, INFO and R buttons



The following functions are controlled using the INFO and R buttons.

- To select a different indication on the 3-digit display, press the INFO pushbutton.
- To select different units (e.g. miles and km or °C and °F) on the three character display or the line display (cars with manual gearbox only), press the R and INFO buttons simultaneously and hold them down for more than 4 seconds.
- To switch off the EDU control module display lighting (provided that the ignition is on and that no warning lamps are lit), press the R and INFO buttons at the same time for less than 4 seconds. To illuminate the EDU control module display lighting, press the INFO button.
- To reset the average fuel consumption and range on remaining fuel indications, press the R pushbutton for more than four seconds.

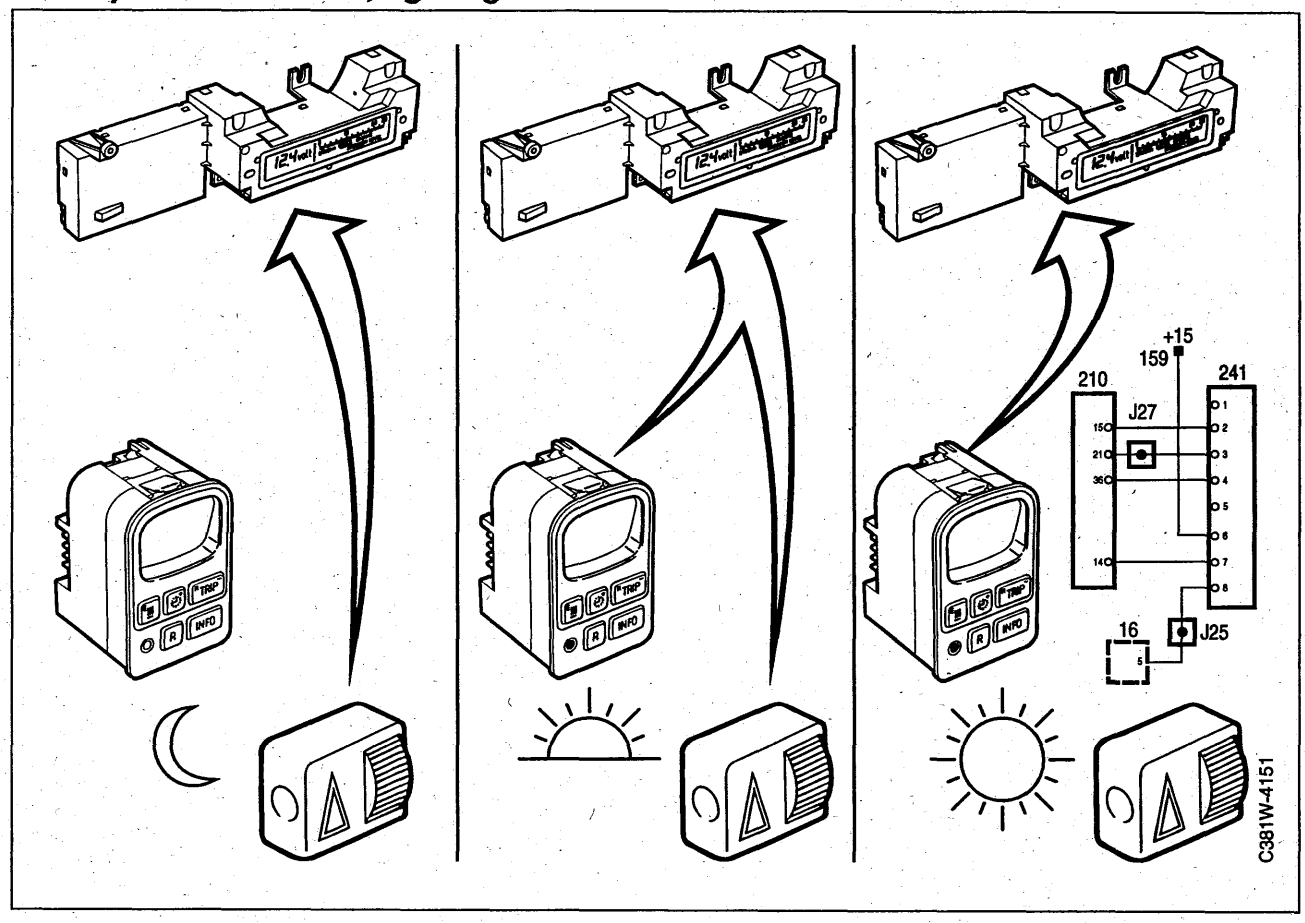
INFO button

When the INFO button is pressed, control module pin 14 is grounded by the clock/SCC. When the button is not pressed, the control module feeds battery positive voltage on pin 14.

R button

When the R button is pressed in, pin 15 on the control module is grounded by the clock/SCC. When the button is not pressed in, the control module feeds battery positive voltage on pin 15.

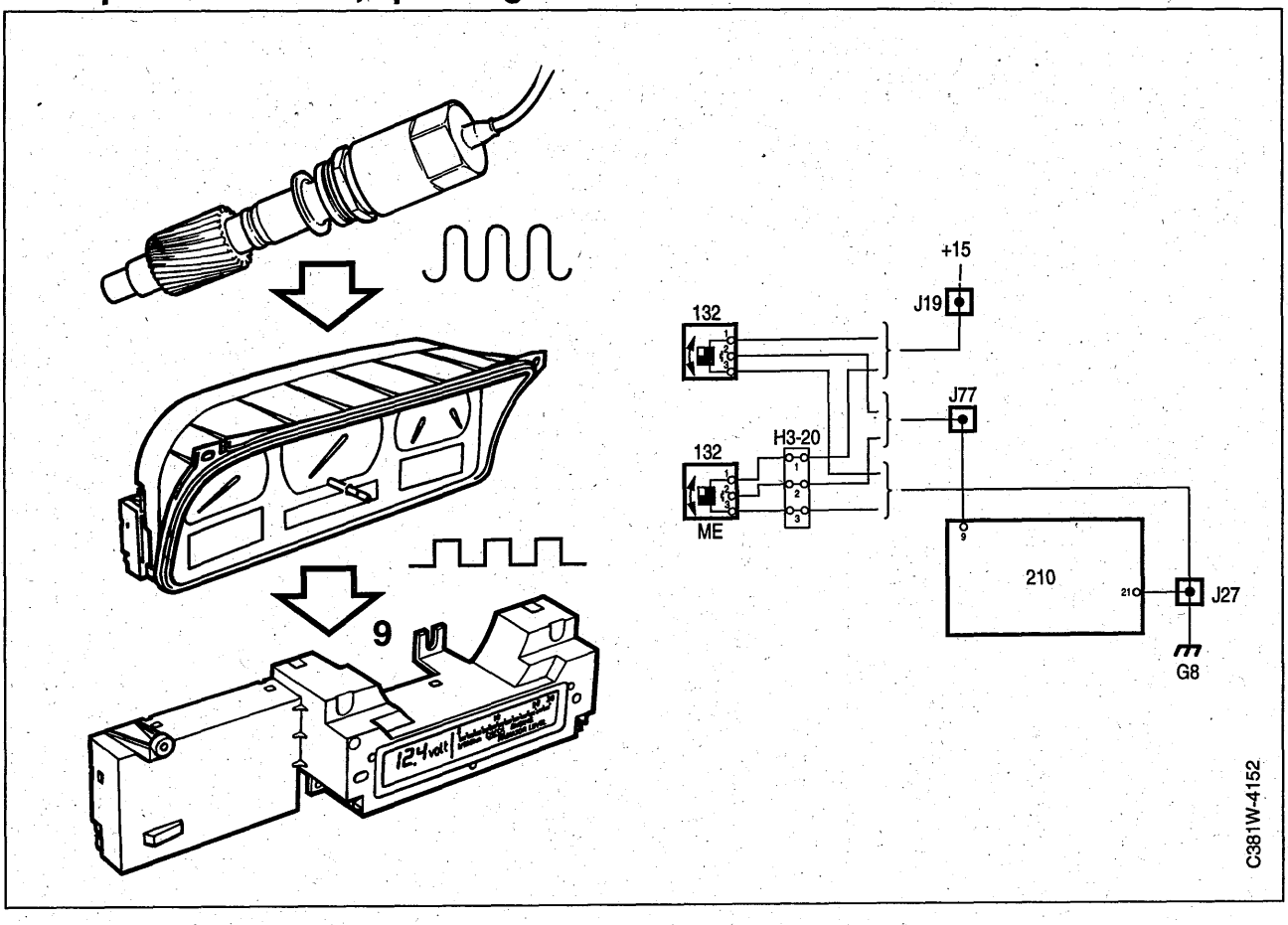
Description of function, lighting in EDU



The EDU display is lit by three lamps mounted on the back of the computer. When driving in the dark, the lighting is controlled by the rheostat that feeds pin 32 on the control module with a PWM signal (pulse width modulated) in the range 13 - 100% depending on the position of the rheostat. The light must be switched on. With the light switched off, there is no rheostat voltage to the EDU, which then assumes the "rheostat value" to be 100%.

When driving in daylight, the light in the cabin is measured by a light sensor on the SCC unit or on the front of the clock. Depending on the intensity of the light, pin 36 on the control module is fed by the light sensor that controls the lighting with a voltage in the range 0V - 10V.

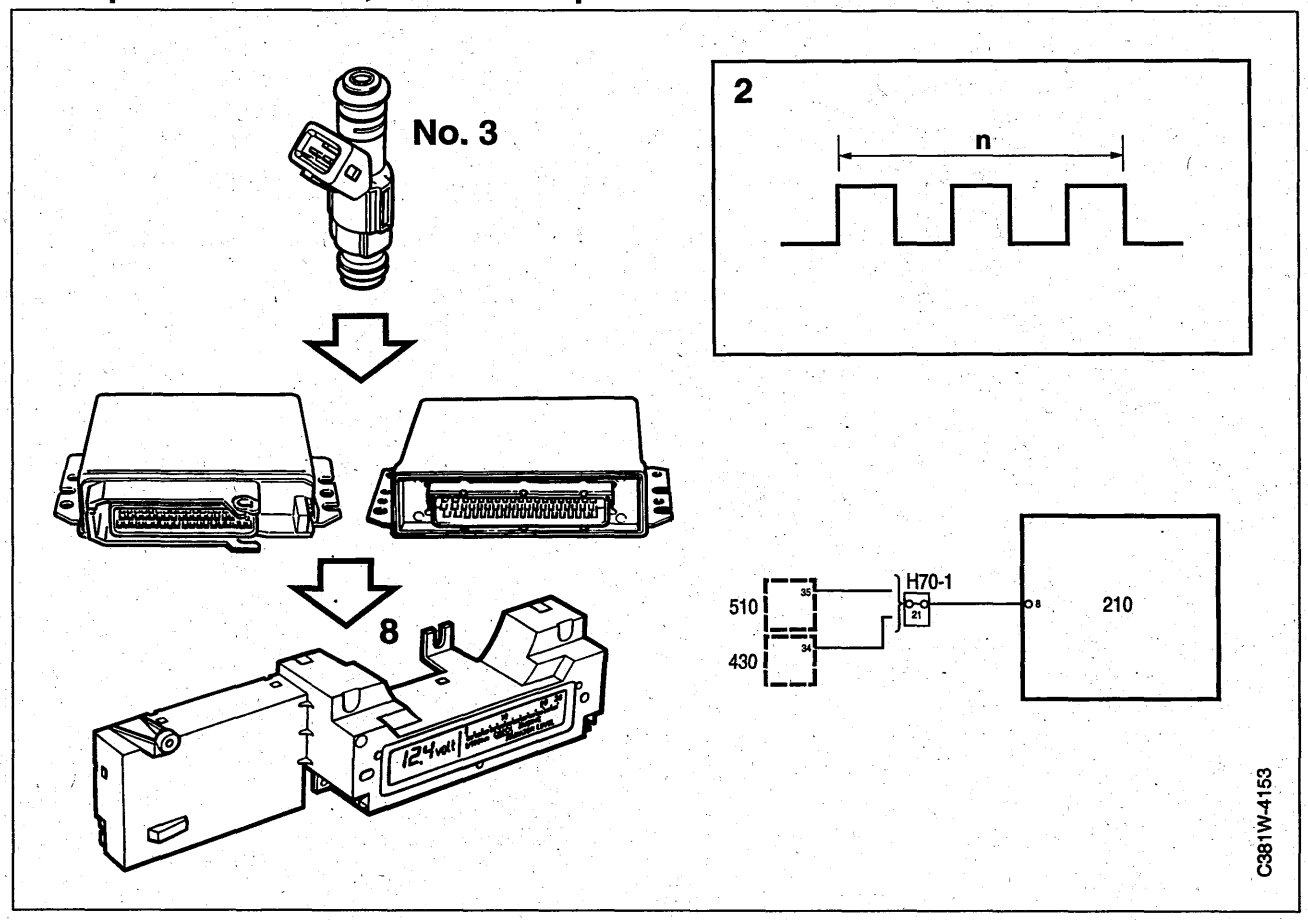
Description of function, speed signal



The vehicle speed sensor in the gearbox sends a sin wave alternating voltage to the speedometer. The frequency of the voltage is proportional to the speed of the sensor spindle (16Hz/sensor revolution) and the amplitude increases with the frequency.

The electronic speedometer processes the alternating voltage and generates a pulsed square wave signal (4.8 pulses/revolution of the drive wheel) which is proportional to the speed. This means that if the speed increases, the number of pulses in the same time period increases. This signal goes to pin 9 on the control module. The control module uses the speed signal together with signals from the fuel injectors to calculate the fuel consumption.

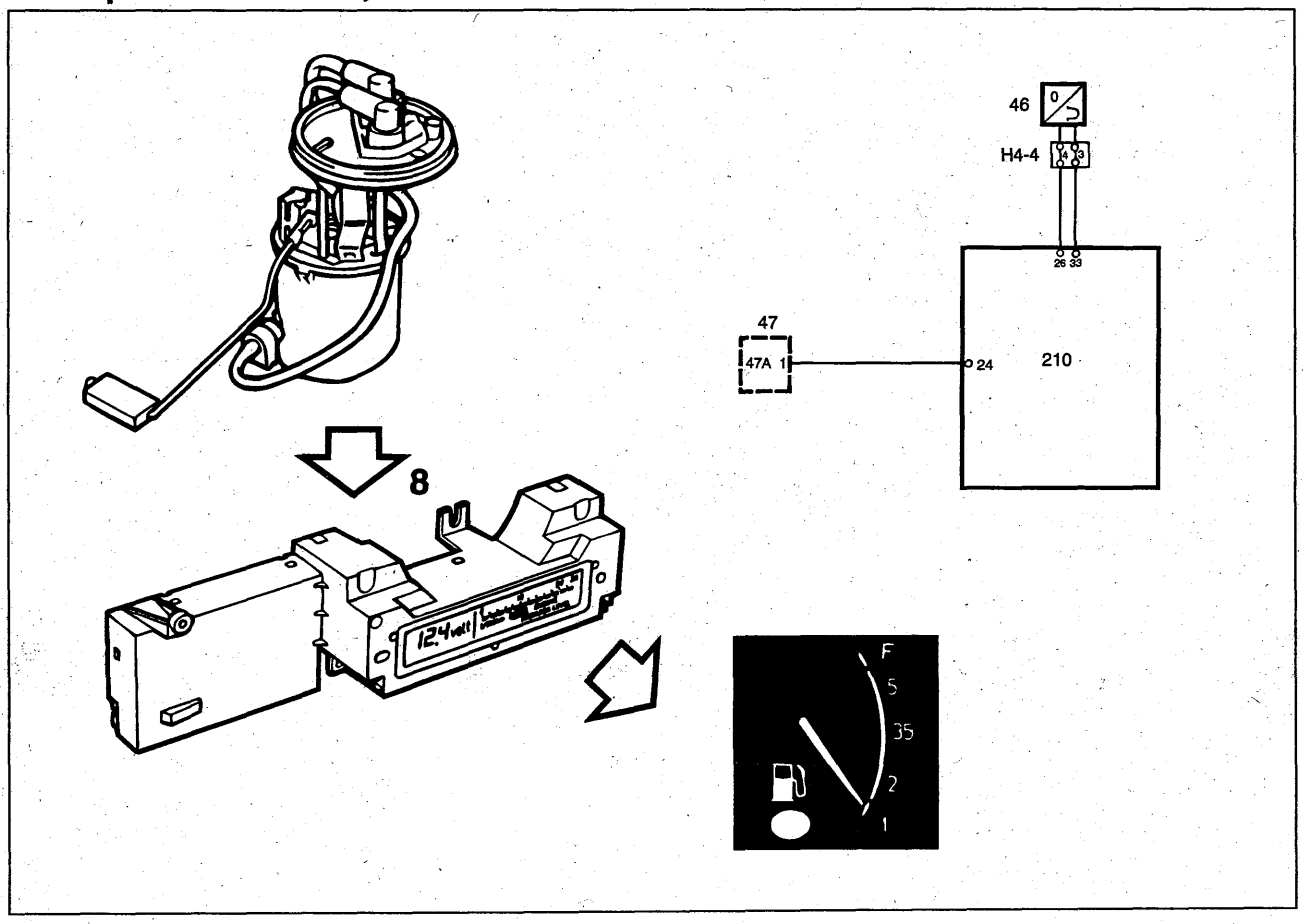
Description of function, fuel consumption



Pin 8 on the control module receives data about fuel injection. If the car is equipped with Motronic, this signal comes directly from the lead to injector 3. If the car is equipped with Trionic, the signal is generated by the Trionic control module which then feeds it to the EDU control module.

Irrespective of which engine management system the car is equipped with, the EDU control module calculates fuel consumption by measuring the length of the input signal pulses.

Description of function, fuel level sensor

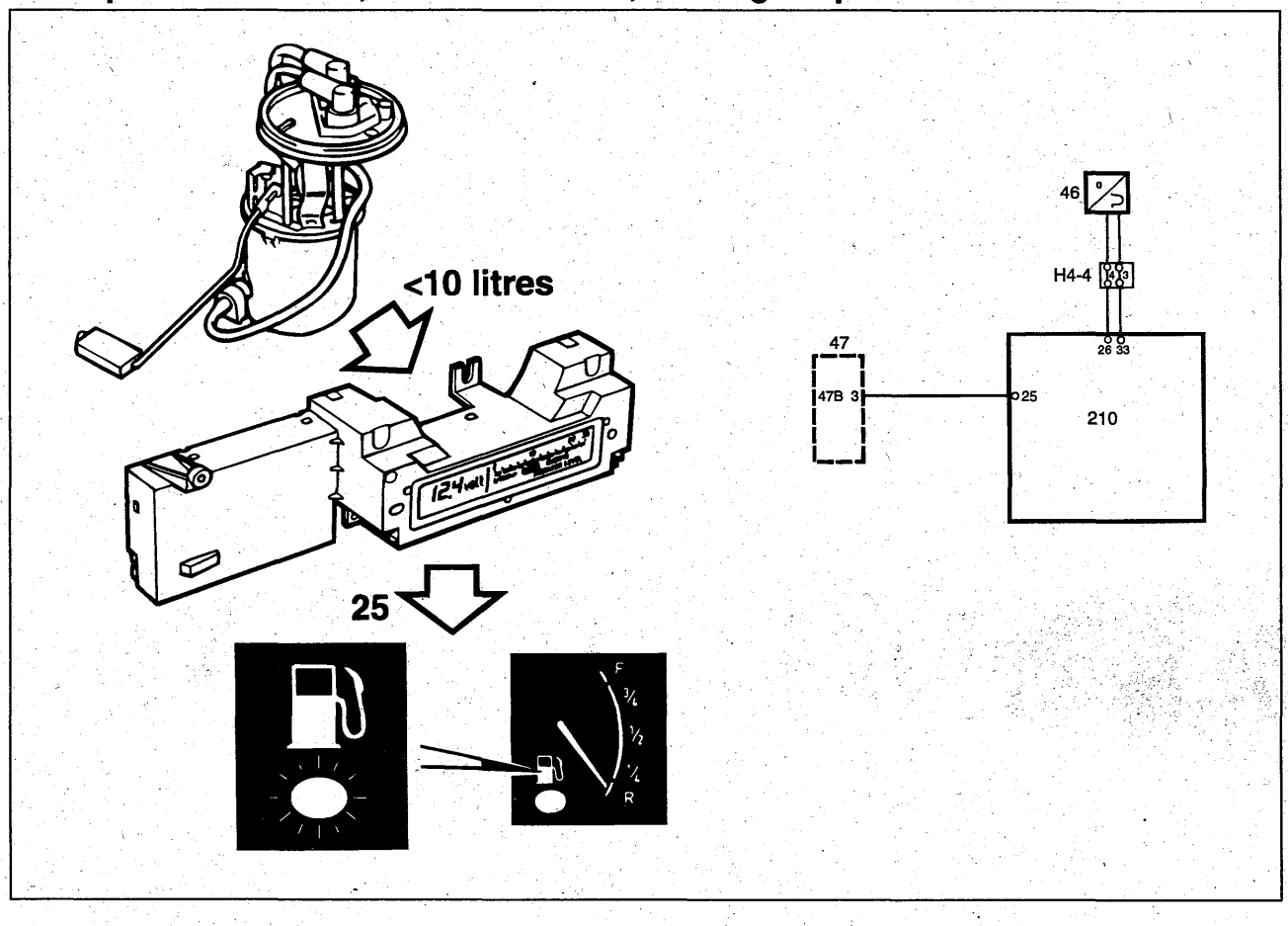


The fuel level sensor in the pump unit has a float arm with a slip contact which is in contact with a stepping resistor.

The level sensor is voltage fed from pin 33 on the control module and is grounded by pin 26. The EDU measures the resistance of the level sensor which increases with the level of fuel in the tank.

The fuel level is measured every 50 ms. The fuel gauge display is based on an average value which is calculated every 32 seconds.

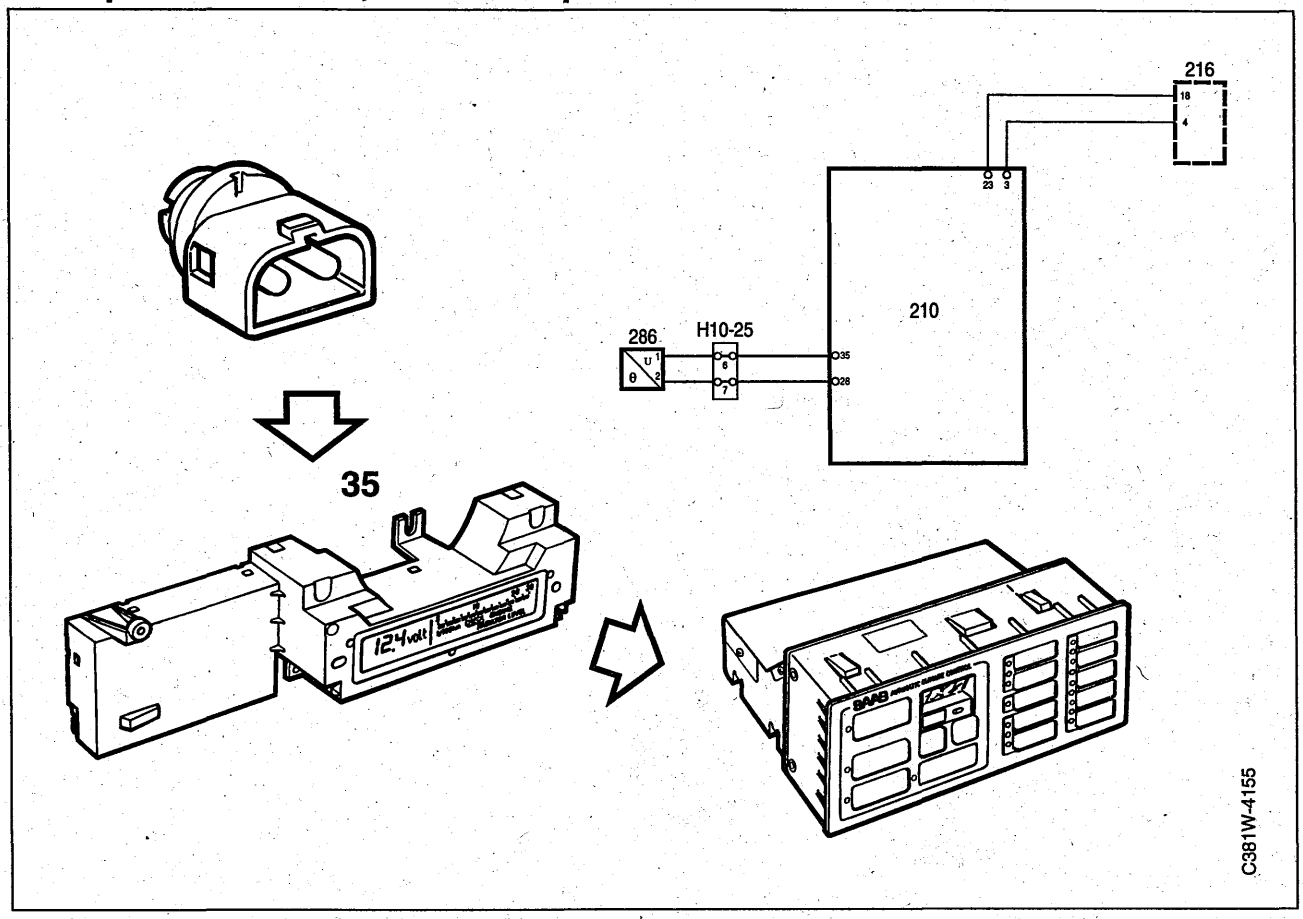
Description of function, fuel level sensor, warning lamp



The EDU control module lights the fuel warning lamp by grounding pin 25 when the fuel level in the tank drops below 10 liters.

When the ignition is switched on, the fuel warning lamp lights and then goes out after 4 seconds if the fuel level is over 10 liters.

Description of function, outside temperature sensor



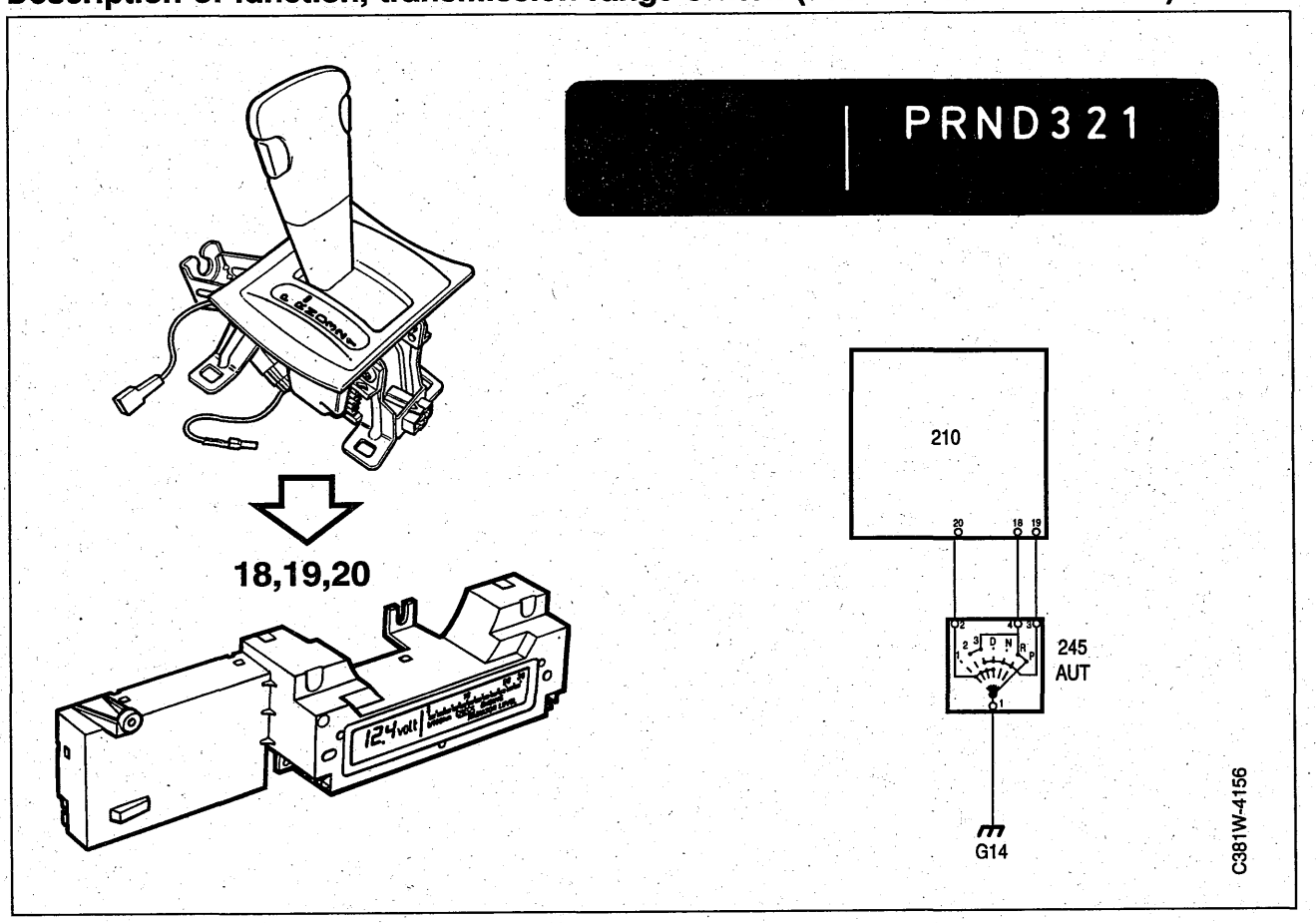
The outside temperature sensor consists of an NTC resistor whose resistance varies with temperature. The sensor is voltage fed with 5 volts from pin 35 on the control module and is grounded on pin 28 on the control module. The control module registers the temperature by measuring the resistance of the thermistor.

When the ignition has been switched off for **more than 5 minutes**, the temperature indicated by the sensor is immediately displayed. When the ignition has been switched off for **less than 5 minutes**, it is the temperature before the ignition was switched off that comes up on the display.

To prevent an erroneous outside temperature being displayed, when for example driving in a traffic jam, change of the value displayed is limited to 1 °C per 40 second interval.

On the other hand, when the temperature is dropping, the displayed value is updated as normal, once every second.

Description of function, transmission range switch (automatic transmission)



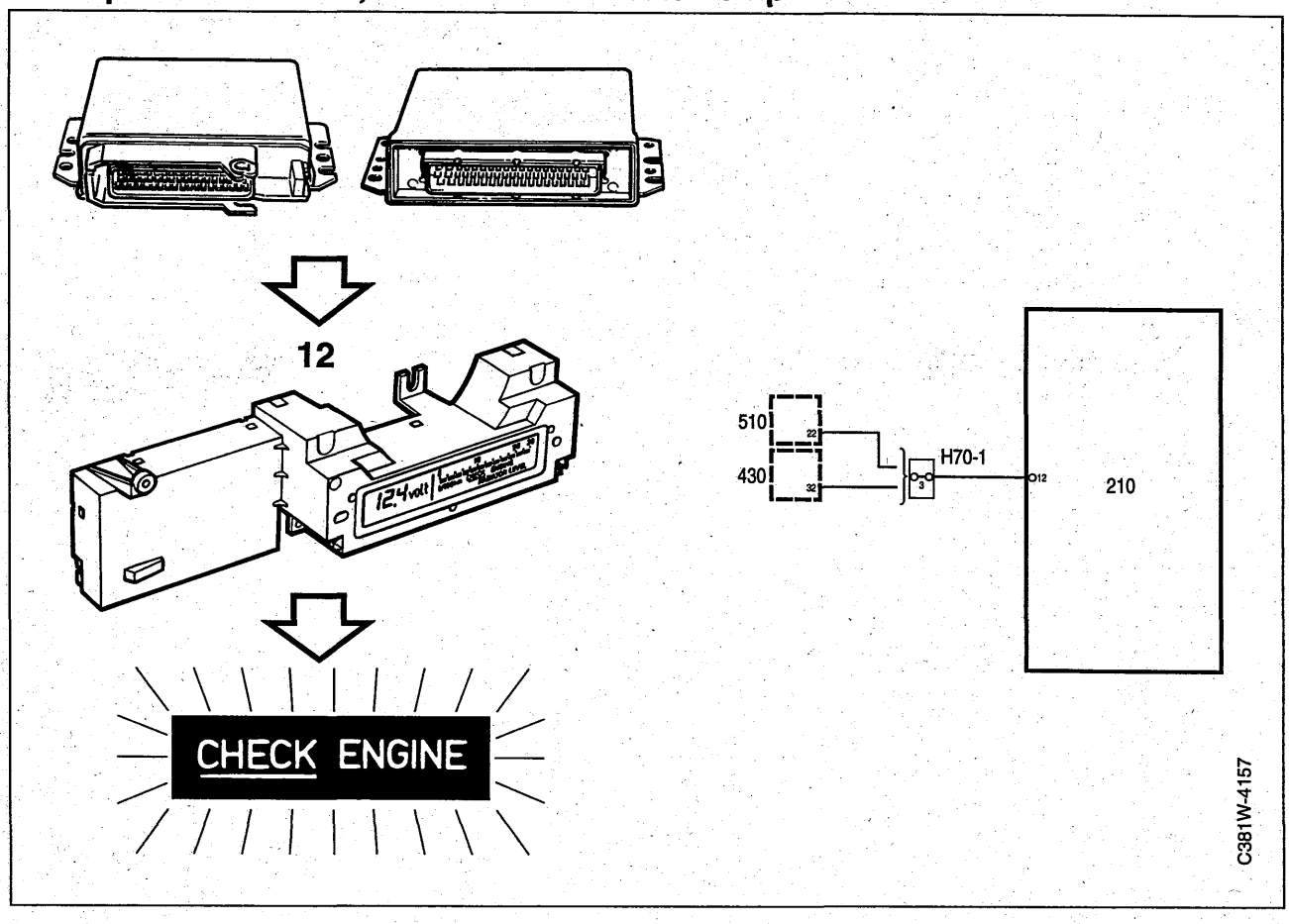
On cars with automatic trassmission, the display shows the selected transmission range with a line under the appropriate transmission symbol.

To get data on the transmission range, the control module measures battery positive voltage on pins 18, 19 and 20. Depending on the transmission range, the transmission range switch grounds these pins in different combinations as shown on the table.

	Pin		
	18	19	20
Transmission range			
P	ON 0 V	OFF 12 V	OFF 12 V
R	ON 0 V	ON 0 V	OFF 12 V
N	OFF 12 V	ON 0 V	OFF 12 V
D	OFF 12 V	ON 0 V	ON 0 V
3	ON 0 V	ON 0 V	ON 0 V
2	ON 0 V	OFF 12 V	ON 0 V
1	OFF 12 V	OFF 12 V	ON 0 V
Manual gearbox	OFF 12 V	OFF 12 V	OFF 12 V

OFF 12 V = open circuit
ON 0 V = closed circuit

Description of function, malfunction indicator lamp



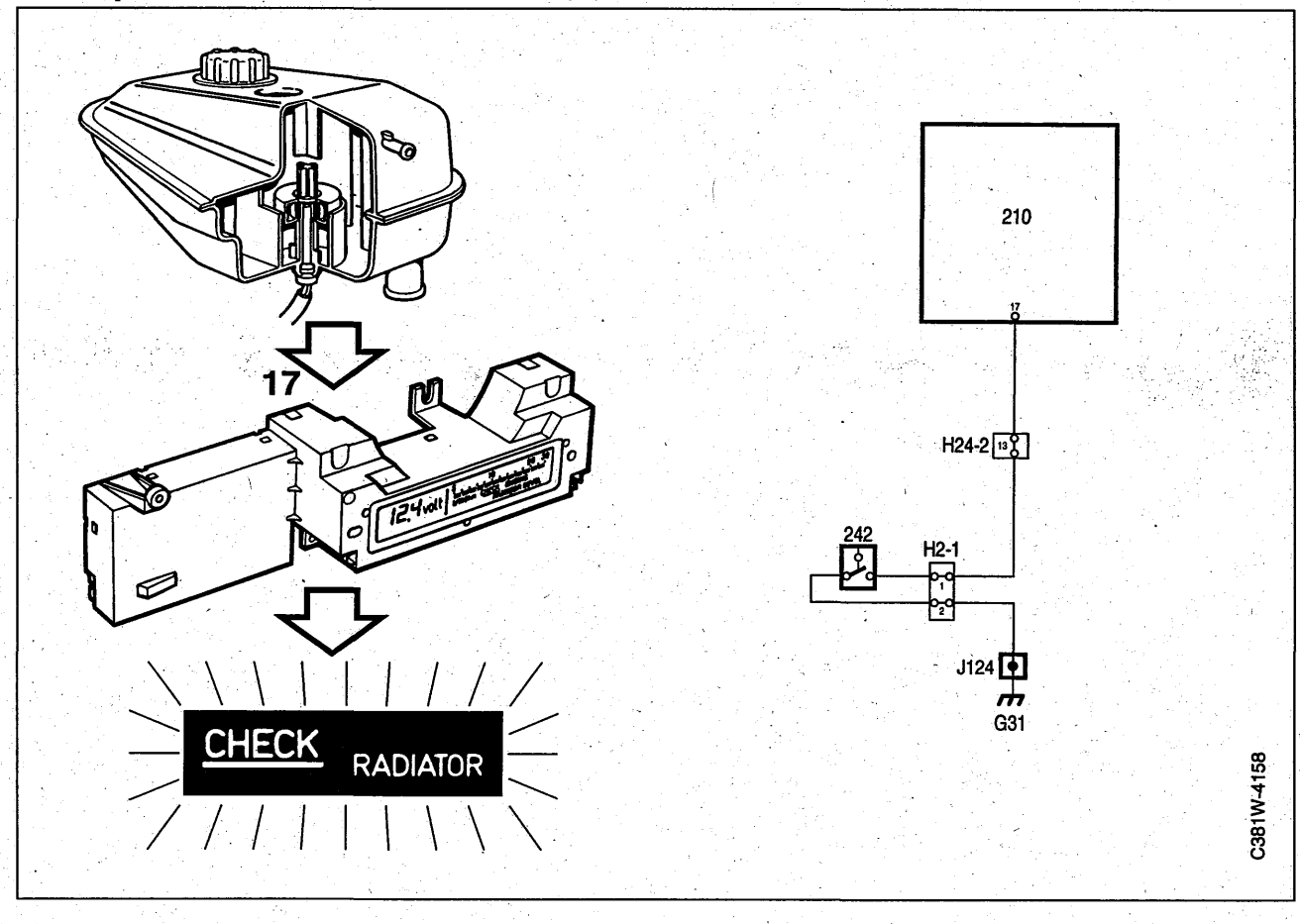
The malfunction indicator lamp warns the driver that something is wrong with the engine management system (Trionic/Motronic).

The control module feeds out battery positive voltage on pin 12 which is grounded by the engine management system when a fault is registered and the lamp lights.

If the car is equipped with Motronic, the malfunction indicator lamp lights when the ignition is switched on and does not go out until the engine has started provided there are no faults that keep the lamp lit.

If the car is equipped with Trionic, the lamp lights during the normal lamp check when the ignition is switched on and then goes out after 4 seconds, except when the engine is running and there is a fault.

Description of function, level switch, coolant



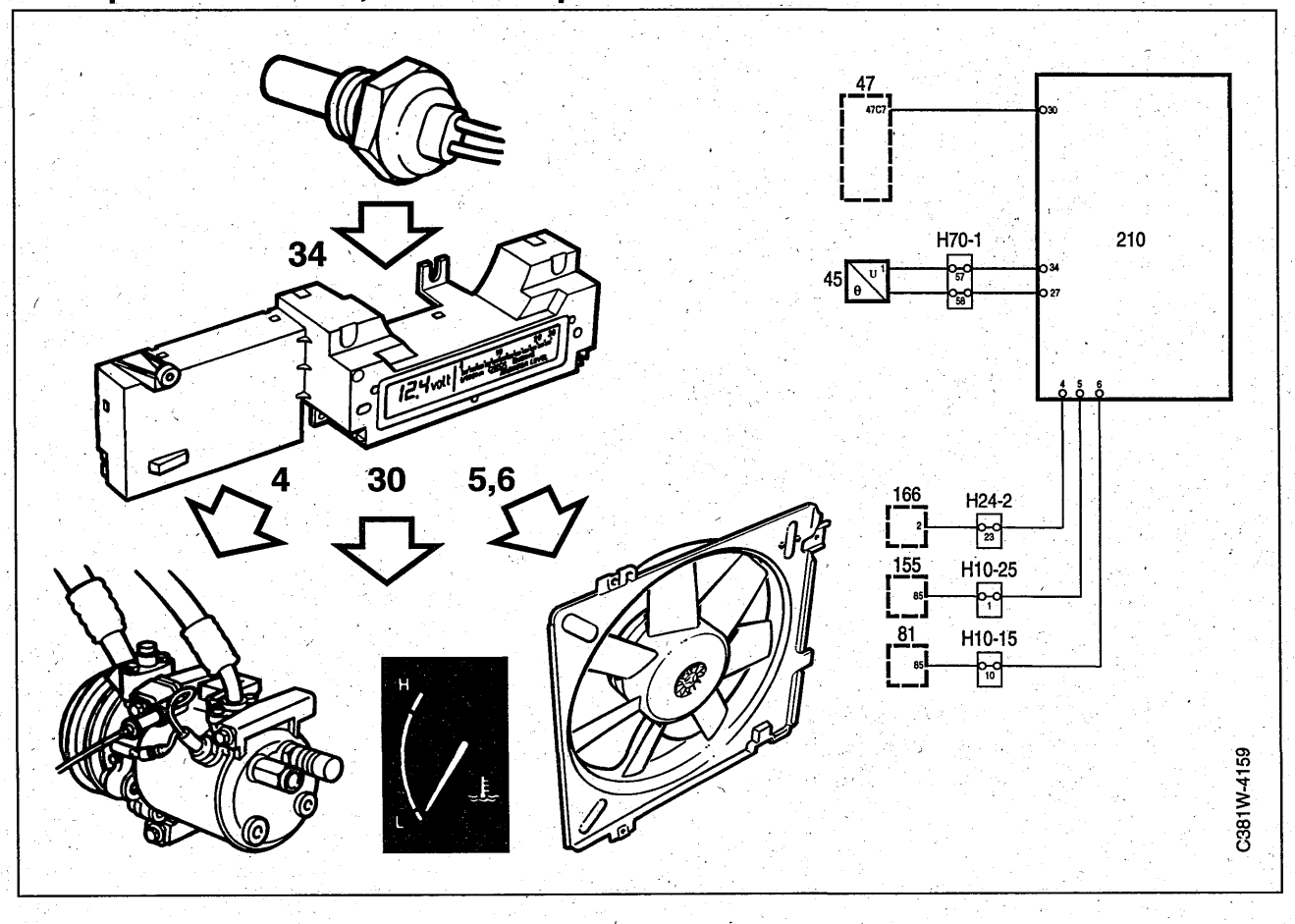
CHECK RADIATOR warns the driver when the coolant level is too low.

The coolant level sensor consists of a round magnetic float which moves up and down a hollow pillar molded in the base of the expansion tank. The reed switch fits inside the hollow pillar from outside the tank and is operated by the magnet when the level of the coolant is low.

The coolant level sensor is fed with battery positive voltage from control module pin 17 and is grounded to grounding point G31. When the coolant level is low, the circuit in the level sensor is closed and control module pin 17 is grounded which lights CHECK RADIATOR on the display.

CHECK RADIATOR goes out after 4 seconds if the coolant level is sufficient. This is the case when the ignition is on, irrespective of whether the engine is running or not.

Description of function, coolant temperature



The engine coolant temperature sensor is connected to the control module. The coolant temperature sensor consists of an NTC resistor which is mounted in the cylinder block (**4 cylinder)** or in the coolant bridge (**6 cylinder**).

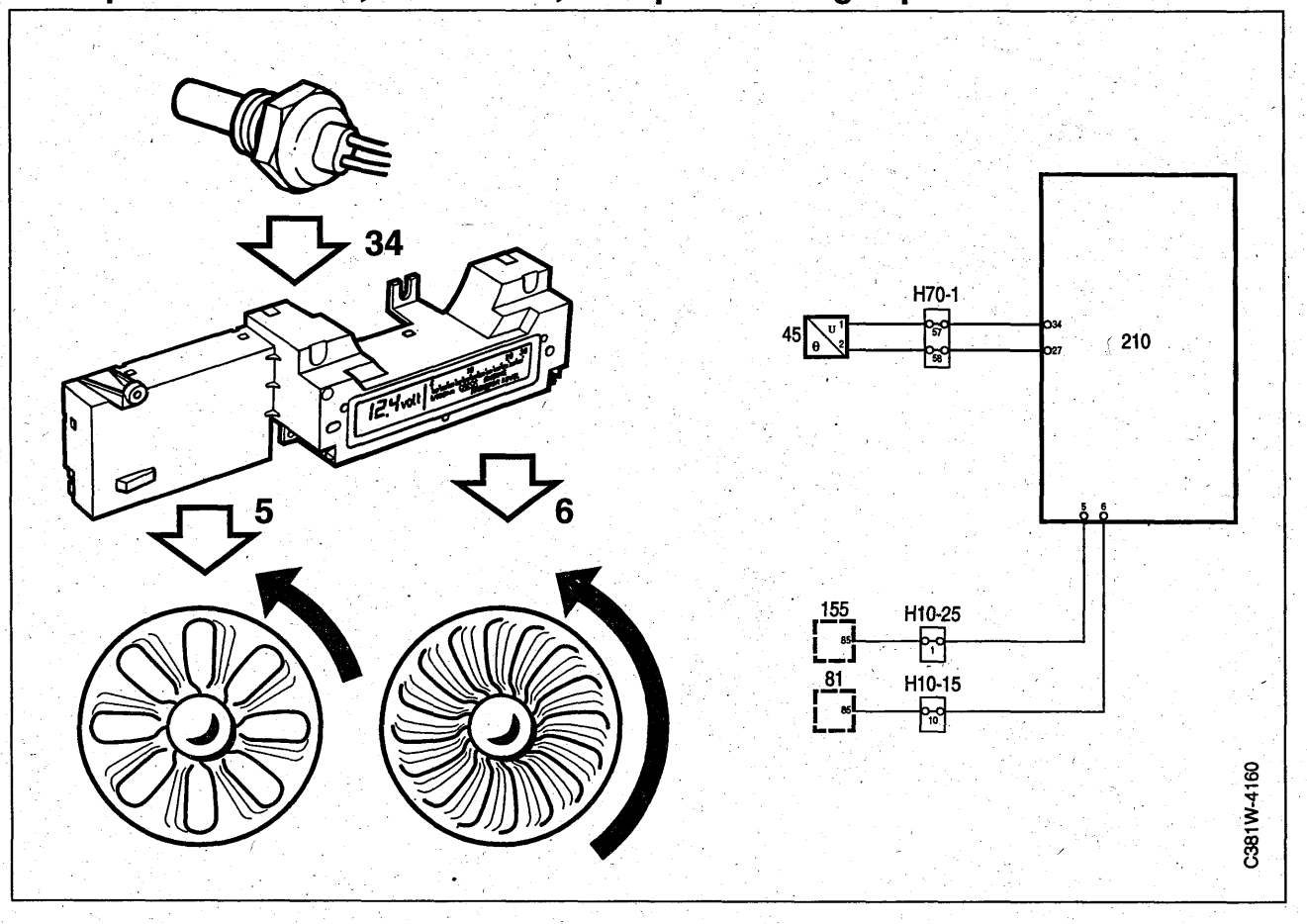
The control module is connected to the coolant temperature sensor with two leads. 1 V is fed from control module pin 34 and grounded on control module pin 27. The control module calculates engine temperature using the resistance in the resistor.

The control module uses this information to control the radiator fan (both steps 1 and 2 depending on the variant), disconnect the A/C compressor at high engine temperatures and control the coolant temperature sensor.

Control of the temperature display is in the control module, that is to say the break points in temperature display are programmed into the control module which feeds out a voltage on pin 30 in the range 1 - 9 V depending on the temperature display. The function of the temperature display is the same as the fuel level gauge display.

If the resistance in the resistor is under 66 Ohms or over 100 KOhms, a diagnostic trouble code is generated in the control module and the control module starts the radiator fan until the fault is remedied.

Description of function, radiator fan, low speed and high speed



The car may be equipped with either a 1 step or a 2 step radiator fan.

The speed of the 1 step fan is somewhere between step 1 and step 2 of the 2 step fan.

The low speed relay is connected to pin 5 and controls the 1 step fan and step 1 of the 2 step fan.

The high speed relay is connected to pin 6 and is used to control the second step in the 2 step radiator fan which can be recognized from the extra resistor mounted near the fan motor.

The control module starts and stops the radiator fan by grounding the relays at pre-programmed coolant temperatures.

If the car is fitted with A/C and the pressure in the A/C is 16.5 bar, the pressure switch closes on the desiccant container and grounds the low speed relay, which starts the radiator fan.

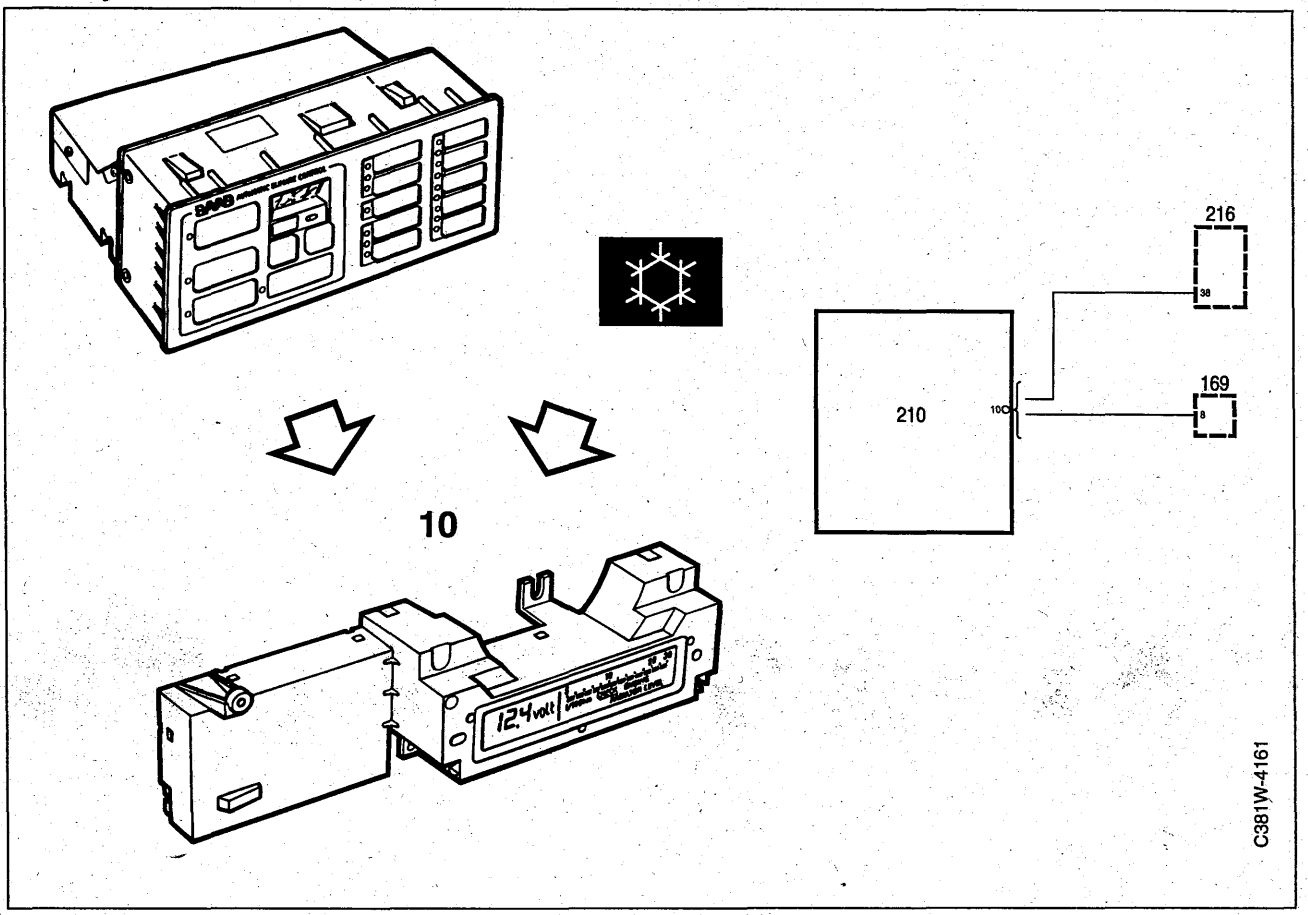
In certain hot markets, there is an extra pressure switch on the lower connection of the condenser which closes at 22 bar and grounds the high speed relay, which results in the fan running at top speed. In order to activate the second step, the engine must be running.

After-running of the fan is in step 1 and the control module reads the temperature for 5 minutes after the ignition is switched off. During these 5 minutes, the fan can be on for a maximum of 3.5 minutes.

⚠ WARNING

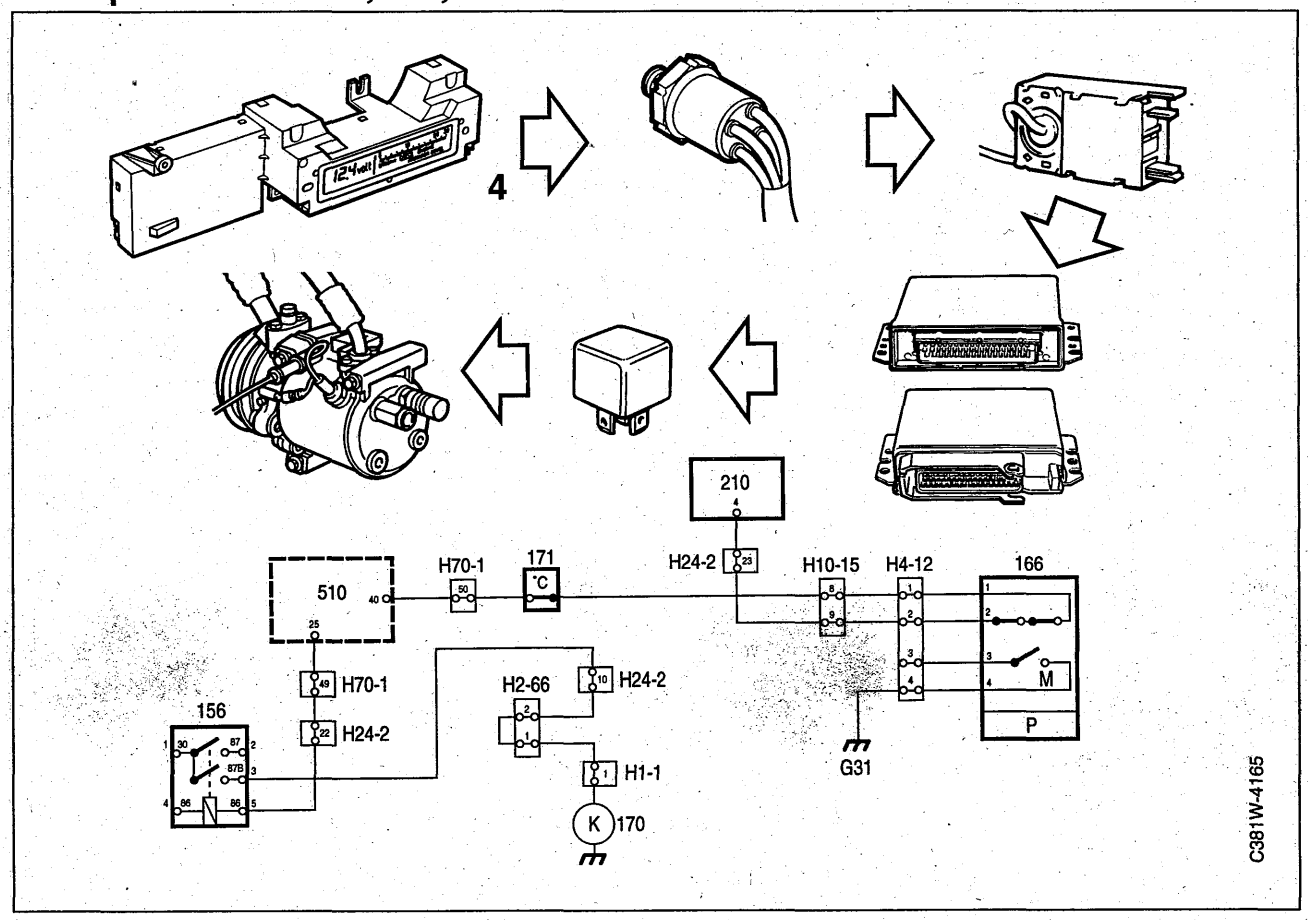
Several minutes can elapse before the fan is switched on. For this reason, avoid touching the fan for at least 5 minutes after the engine has been switched off.

Description of function, A/C, in



When the AC compressor is activated, either by the ACC control module or using the A/C switch, the EDU control module is fed battery positive voltage on pin 10.

Description of function, A/C, out

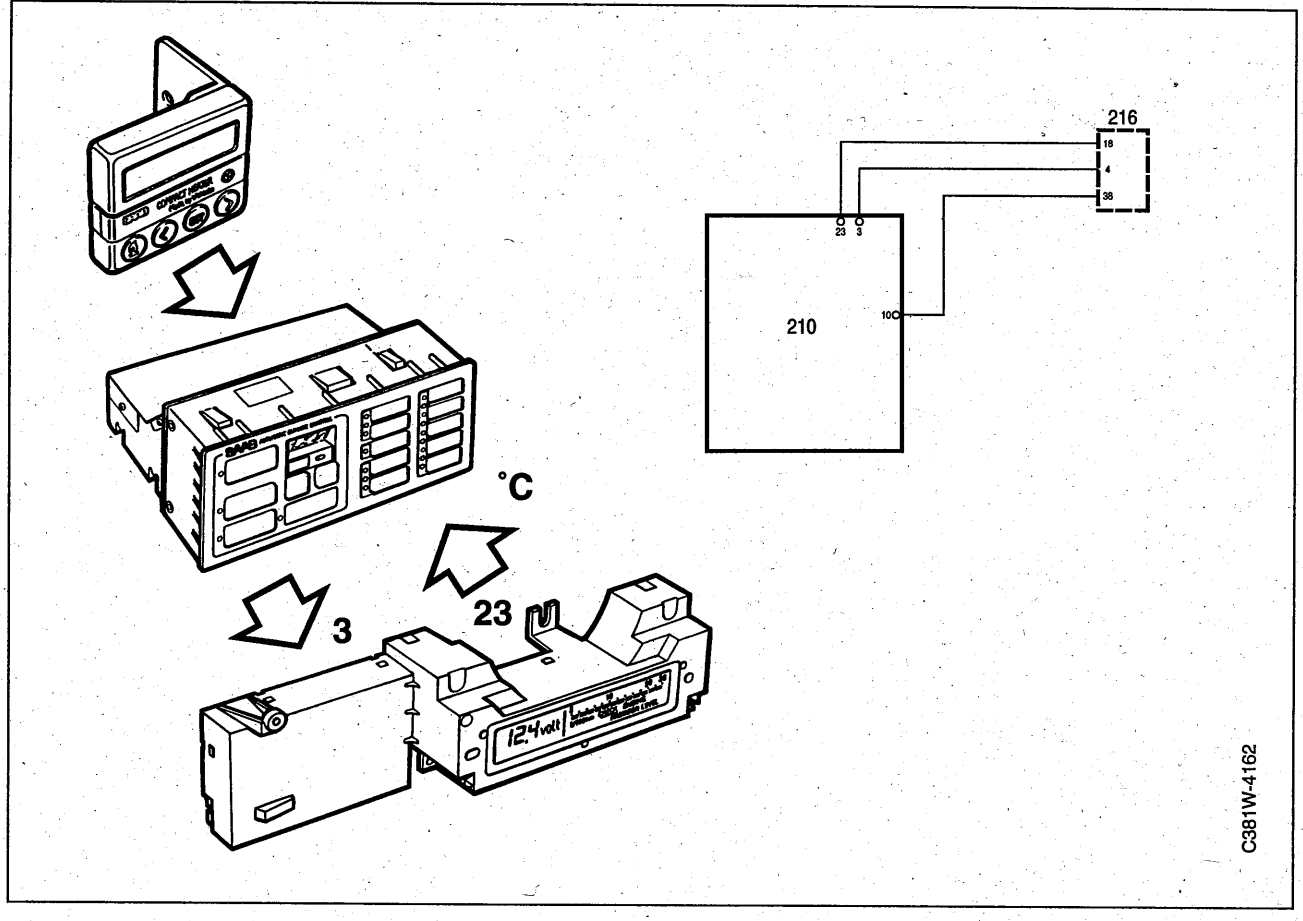


The coolant temperature is continually registered by the EDU control module. To reduce the load at high temperatures (and so protect the engine from overheating), the A/C compressor is disconnected at a certain engine temperature.

If the engine temperature is lower than the temperature for A/C disconnection, the control module supplies battery positive voltage to pin 4 which is connected via pressure switch and anti-freeze thermostat to the Trionic/Motronic control module which, when their conditions for A/C connection have been met, ground the A/C relay.

		4 cyl	6 cyl
A/C disconnected at	°C (°F)	119 (246)	116 (241)
connected at	°C (°F)	118 (244)	115 (239)

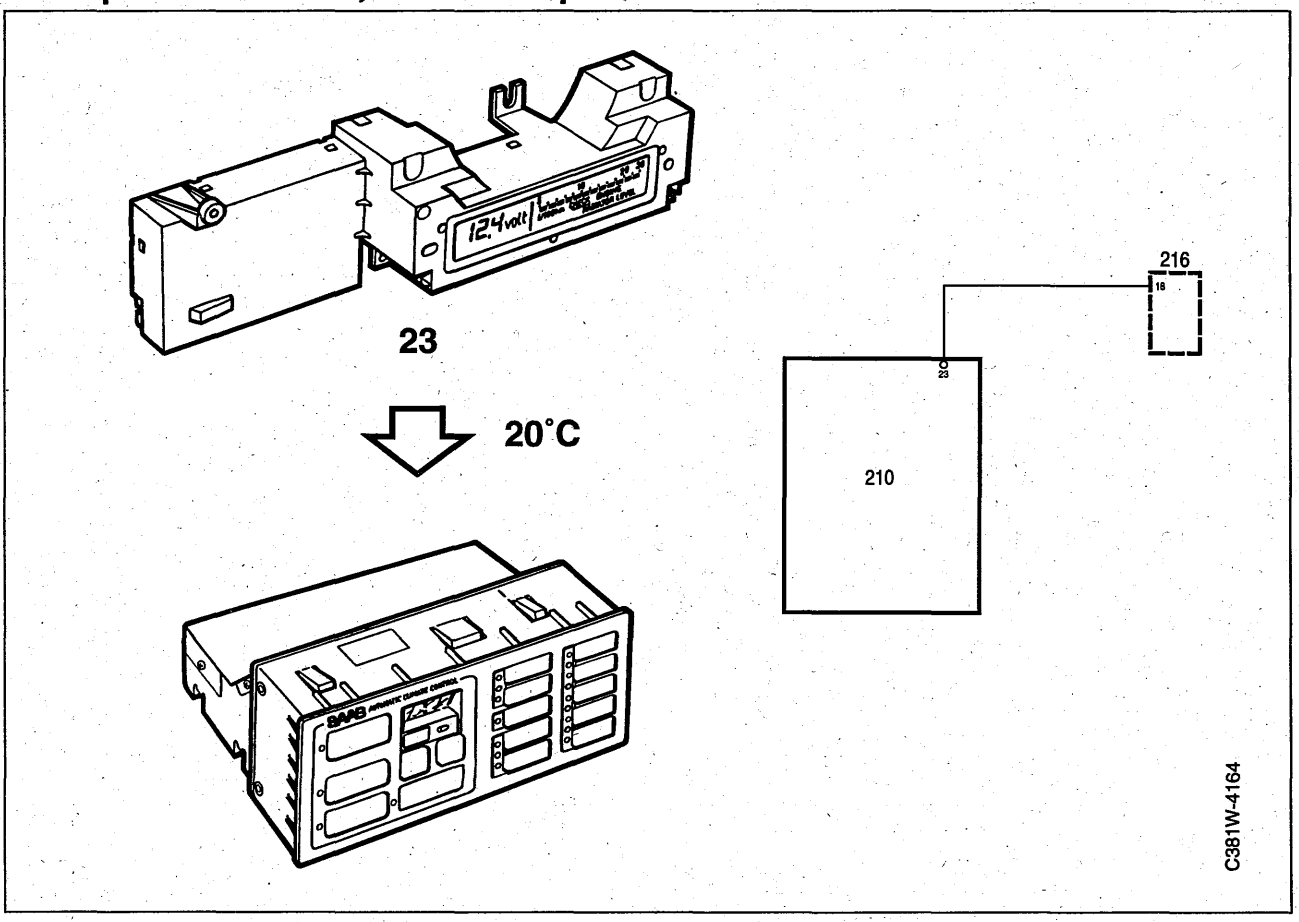
Description of function, parking heater



If the car is equipped with a parking heater, the ACC unit is activated by the parking heater with a 12 V timer signal. The ACC unit then sends a 12 volt "wake up signal" to pin 3 on the EDU control module. The control module then starts to measure and indicate outside temperature and sends pulses showing current outside temperature from pin 23 to the ACC unit.

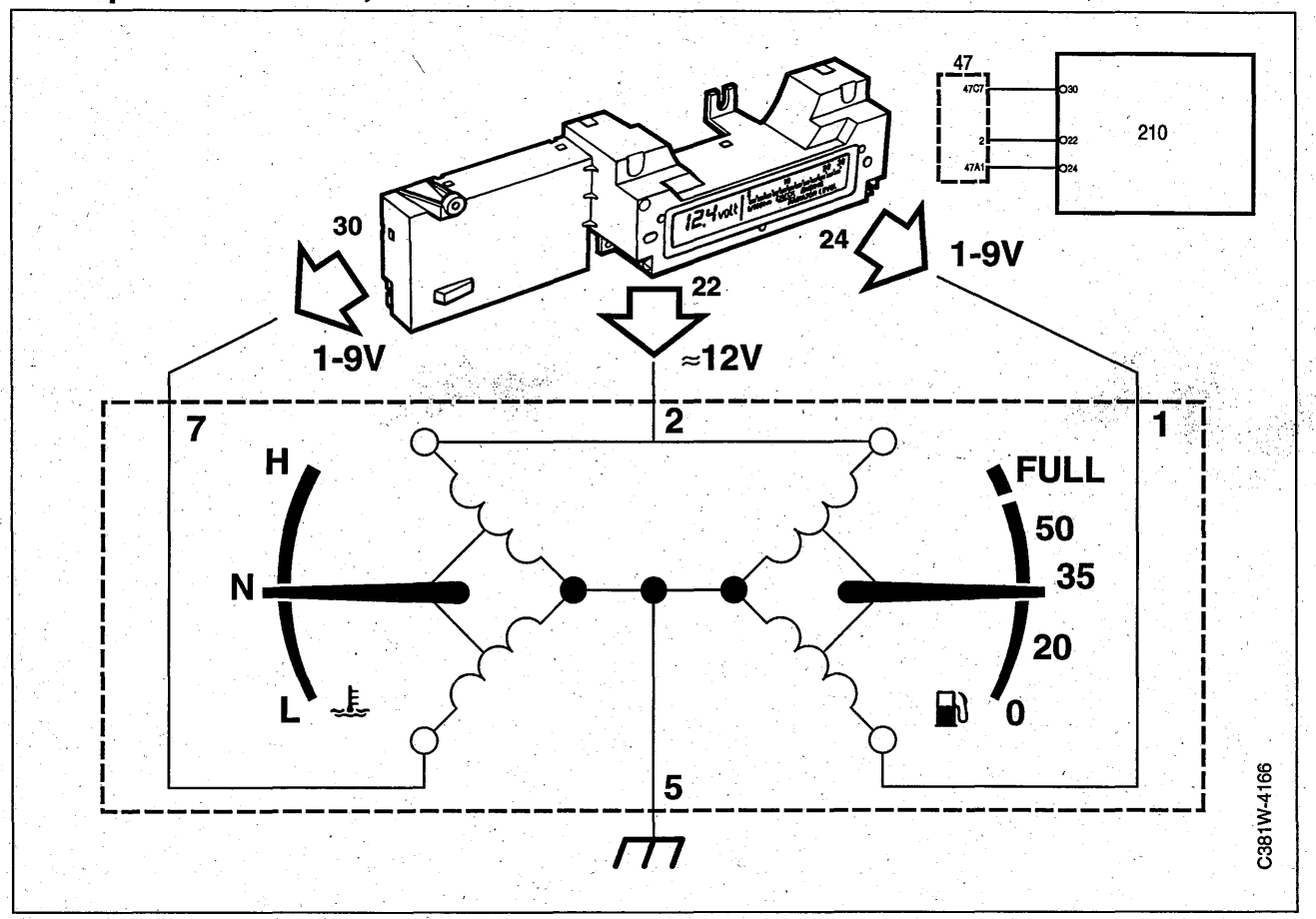
Other functions in the control module are shut off.

Description of function, outside temperature to ACC



The EDU control module sends a temperature signal to the ACC unit on pin 23. The signal consists of a series of pulses where the number of pulses indicates the temperature. The pulse series are separated from each other by a pause of at least 400 ms so that the ACC unit has time to register the end of each series.

Description of function, combined instrument



The combined instrument (fuel gauge/engine temperature gauge) are both two pole instruments where one coil in each instrument is fed with about 12 V from control module pin 22. Both gauges are grounded to grounding point G8.

Fuel level gauge

The control module feeds 1 - 9 V on pin 24 to the second coil in the fuel gauge and in this way controls the gauge reading.

Engine temperature gauge

The control module feeds 1 - 9 V on pin 30 to the second coil in the engine temperature gauge and in this way controls the gauge reading.

Fault diagnosis

Fault diagnosis, general

> ⚠ **WARNING**
>
> **Never** remove the control module signal ground without first disconnecting the battery. The control module can be seriously damaged.

1 SDA MkII must always be connected to the ISAT.

2 The data link connector, which is green, is located under the right-hand front seat. The connector is covered by slitted trim which is held in place by clips.

3 During scan tool diagnostics, the ignition key must always be in the drive position.

4 Read and note stored diagnostic trouble codes in all systems before the battery and control module (if necessary) are disconnected.

5 If incorrect programming is suspected, reprogram the control module.

6 If no communication can be achieved between the ISAT and the control module, first check that the fuses are intact and that there is voltage to the fuses.
Then check the leads between the control module and the data link connector.

7 Also check that the voltage supply and the correct ground are obtained in the data link connector, and that the connector pins are undamaged and secure.

8 To avoid damage to the control module/ components, always check that the ignition is off before the connector(s) are unplugged.

9 Check that the control module ground connections and voltage supplies are correct.

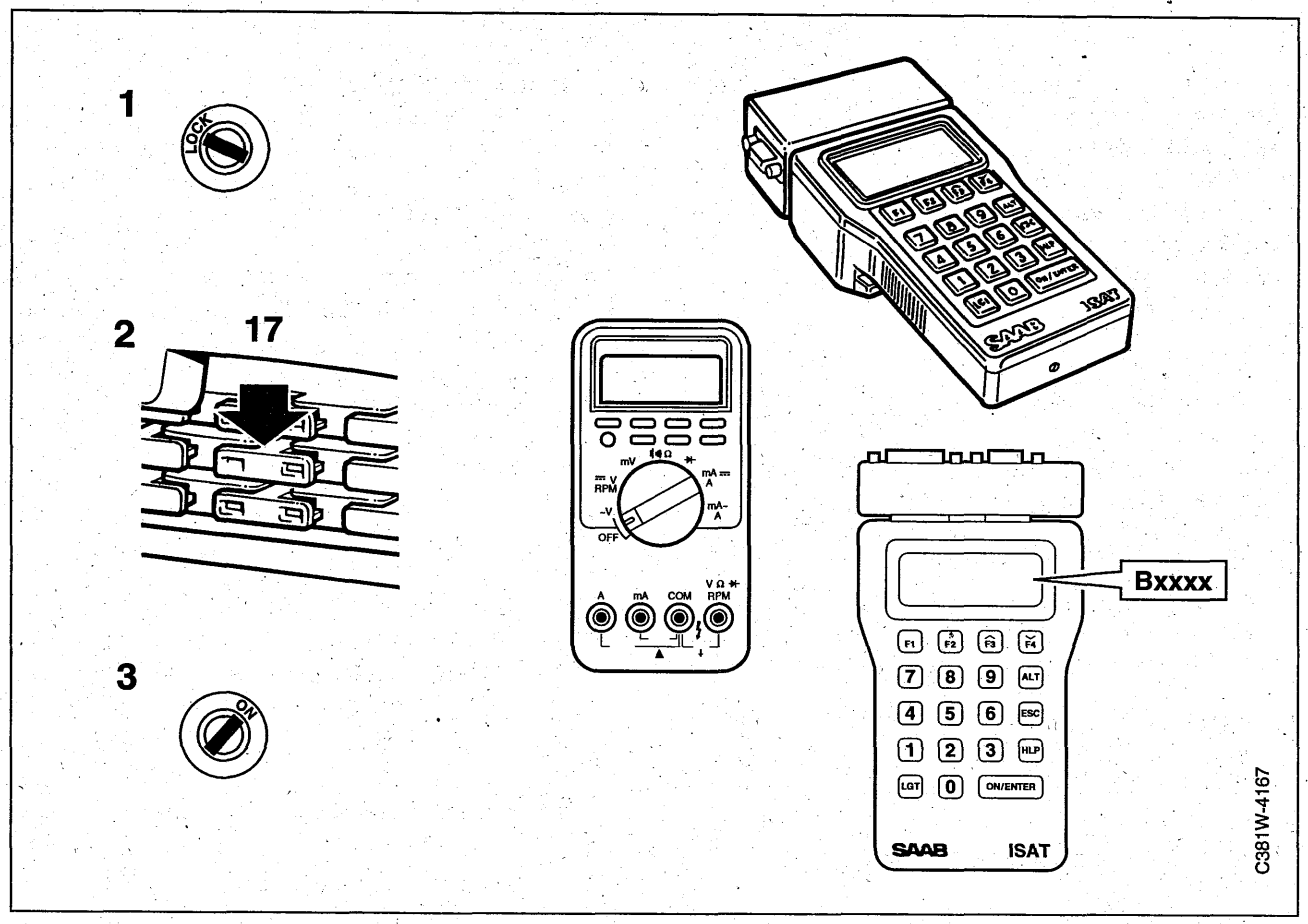
10 It can sometimes be useful to unplug connectors and check that contacts and pins are undamaged and secure.
Reconnect connectors and erase all diagnostic trouble codes. If possible, start/drive the car and see if the fault(s) remain.

11 All voltages around the 12 V level are proportional to the battery positive voltage, and thus the levels should only be used as a guide.

12 0 volt signals indicate ground or 0 volt level. On a sensitive multimeter, a grounding point may show measurable voltage and a 0 volt level (output signal) can, without being faulty, be around 1 V. For this reason, the level should only be used as a guide.

13 Never switch from one unit to another (e.g. from V, via A to Ohms) on the meter without first disconnecting the meter's test leads.

14 Fault diagnosis can also be conducted using a Break Out Box (BOB) and test leads (part No. 86 11 261).



Erasing the memory (alternative to ISAT)

During fault diagnosis, the memory in the EDU control module can become altered and give unusual diagnostic trouble codes.

To erase the memory, proceed as follows:

1 Switch off the ignition

2 Remove and refit fuse 17 (+30) in the electrical distribution box on the passenger side of the facia.

3 Switch on the ignition.

Quick shut-down of the EDU system

If the ignition is switched off with the key, the EDU control module is active for a further 5 minutes.

If quick shut-down of the EDU control module is required, for example for some test function, remove fuse 17 (+30).

The aids to fault diagnosis in the EDU system are the following:

- Diagnostic trouble codes, which can, in certain cases, identify the cause of the fault.
- Fault symptoms, which make it possible to localize the fault.
- Lamp and display tests which make it possible to illuminate the display lighting and all display segments using the ISAT.
- Possibility of activating loads.
- Possibility of reading values.

Certain faults can cause the display to show "---". In this case, conduct fault diagnosis using the ISAT.

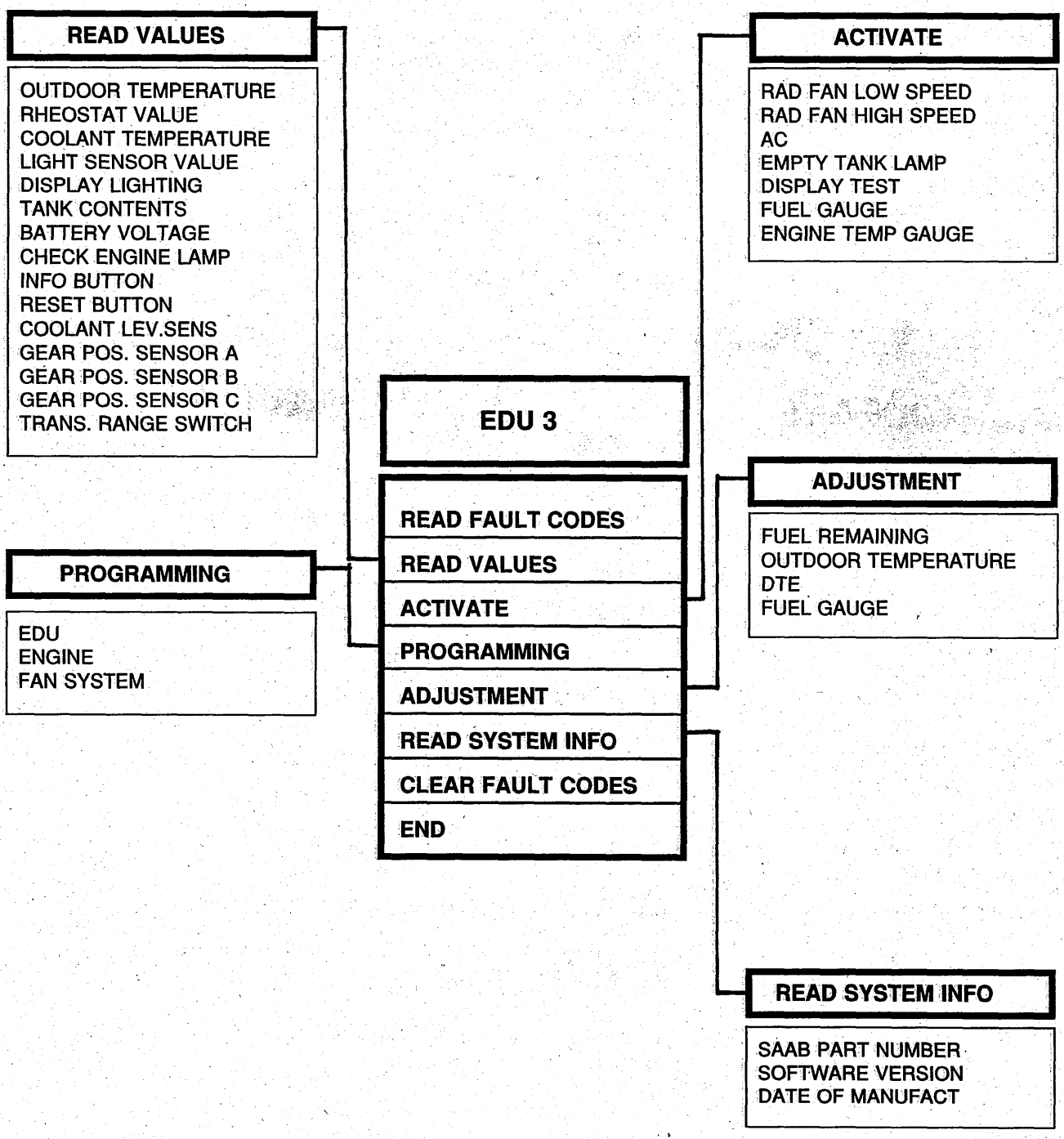
Diagnostic trouble code table, EDU

Diagnostic trouble code (SAE)	Faulty function/component	Text on ISAT display	Action, see page
B1102	Radiator fan high speed relay shorted to battery positive voltage.	FAULT X P/I B1102 RAD FAN HIGH SPEED RELAY SHORT TO BATTERY+	59
B1103	Radiator fan high speed relay, open circuit	FAULT X P/I B1103 RAD FAN HIGH RELAY OPEN CIRCUIT	60
B1104	Radiator fan low speed relay shorted to battery positive voltage	FAULT X P/I B1104 RAD FAN LOW SPEED RELAY SHORT TO BATTERY+	61
B1312	Coolant temp.,shorted to ground	FAULT X P/I B1312 COOLANT TEMPERATURE INPUT LOW/SHORTING TO GROUND	62
B1313	Coolant temp., shorted to battery positive voltage	FAULT X P/I B1313 COOLANT TEMPERATURE INPUT HIGH/OPEN SHORTING TO BATT+	63
B1722	Fuel level sensor, shorted to ground	FAULT X P/I B1722 FUEL LEVEL SENSOR SHORT TO GROUND	64
B1723	Fuel level sensor, open circuit	FAULT X P/I B1723 FUEL LEVEL SENSOR OPEN CIRCUIT	64
B1605	Control module, internal fault	FAULT X P/I B1605 ECU FAULT	92
B1745	Outside temperature, no signal	FAULT X P/I B1745 OUTDOOR TEMPERATURE NO SIGNAL	65
B1775	Transmission range switch faulty	FAULT X P/I B1775 TRANS. RANGE SWITCH INPUT WRONG	66

Faults without diagnostic trouble codes

Fault symptom	Component/function	see page
Display blank	Voltage supply	67
Display unclear in strong sunlight	Light sensor	69
The EDU control module does not respond when buttons pressed	INFO and R buttons	70
Parts of the display dark	Lamps	95
L/km: Current fuel consumption shows maximum when driving	Fuel consumption	72
MPG: Current fuel consumption shows minimum when driving	Fuel consumption	72
L/km: Current fuel consumption shows minimum	Fuel consumption	73
MPG: Current fuel consumption shows maximum	Fuel consumption	73
The fuel warning lamp does not light os lights continuously Fuel gauge normal	Fuel level and range counter	74
Fuel gauge displays zero or max., range counter normal and tank gauge correct. The fuel gauge shows zero. With the rheostat in the min. position, the right-hand direction indicator lamp "glows". With the rheostat in the max. position it lights brightly.	Fuel level and range counter	75
Fuel gauge and DTE faulty	Fuel gauge float arm	77
Permanently high outside temperature reading	Outside temperature sensor	78
A/C out of order and the fault leads to the circuit in the EDU.	A/C	79
The CHECK functions do not light when the ignition is switched on or do not go out when the engine starts	CHECK functions	80, 82
Radiator fan not working (step 1 if there are 2)	Radiator fan	84
Radiator fan, step 2 not working	Radiator fan	85
Engine temperature display not working	Engine temperature display	86

MENU STRUCTURE, MAIN DIAGRAM



Command menu "READ VALUES"

ISAT Display	Function
OUTDOOR TEMPERATURE XX °C YY °F	Shows the outside temperature in °C and °F
RHEOSTAT VALUE XXX %	Shows the rheostat value in % (0 - 100%) Light on gives a value between 13 and 100% Light off gives the value 100%.
COOLANT TEMPERATURE XXX °C YYY °F	Shows the coolant temperature in °C and °F
LIGHT SENSOR VALUE XX.X V	Shows the cabin light value in V (0 - 10V)
DISPLAY LIGHTING XXX %	Shows the display lighting in % (0 - 100%)
TANK CONTENTS XX Liters YY US gallons ZZ Imp gallons	Shows the contents of the tank in liters, US gallons and Imp. gallons
BATTERY VOLTAGE XX.X V	Shows battery positive voltage in V
CHECK ENGINE LAMP ON 0 V OFF 12 V	Shows the status of the malfunction indicator lamp
INFO BUTTON ON 0 V OFF 12 V	Shows the status of the INFO button
RESET BUTTON ON 0 V /OFF 12 V	Shows the status of the R button
COOLANT LEV.SENS ON 12 OFF 0 V	Shows the status of the coolant level sensor
GEAR POS. SENSOR A ON 0 V/OFF 12 V	Status of transmission range switch A
GEAR POS. SENSOR B ON 0 V/OFF 12 V	Status of transmission range switch B
GEAR POS. SENSOR C ON 0 V/OFF 12 V	Status of transmission range switch C
SELECTOR LEVER POS.	Shows the position of the gear selector lever P, R, N, D, 3, 2, 1, Manual

Command menu "ACTIVATE"

ISAT Display	Function
RADIATOR FAN LOW ON OFF	Radiator fan, low speed activated
RADIATOR FAN HIGH ON OFF	Radiator fan, high speed activated
AC ON OFF	The A/C compressor is activated (the signal is sent to the engine management system)
EMPTY TANK LAMP ON OFF	Warning lamp fur empty tank ON/OFF
DISPLAY TEST IN PROGRESS....	All EDU functions on the display go to full light strength
FUEL GAUGE (0-70) Litres	Select the number of liters on the ISAT. The gauge reading should correspond to the number of liters programmed
ENGINE TEMP GAUGE (0-147°C) ---	Select temperature. The temperature gauge reading should correspond to the programmed temperature

Command menu "READ SYSTEM INFO"

ISAT Display	Function
PART NUMBER XX XX XXX	Part number of the EDU control module
PROGRAM VERSION XXXXXXXXXX	Program version of the EDU control module
DATE OF MANUFACT XXXXXXXXXX	Date of manufacture of the EDU control module

Programming/adjusting the EDU

When changing an EDU3 unit, it must be changed using the ISAT. Select "PROGRAMMING" in the "EDU3" menu. Respond to the questions asked by the ISAT.

Note:

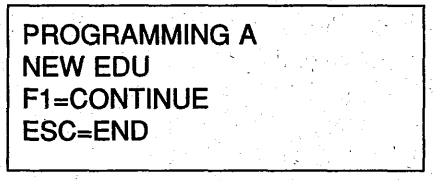
The ISAT normally verifies the values last programmed when programming/adjusting. When EDU programming, **this is not done**. This means that it is not possible to program once and then once more and check what has been programmed.

Important

When programming, the display can flash and the temperature/fuel gauges fluctuate up and down. This is caused by the programming voltage and is perfectly normal.

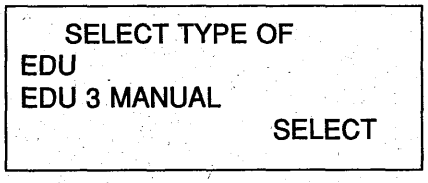
Programming

ISAT DISPLAY 1



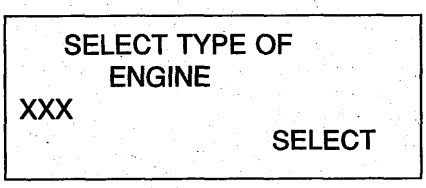
1 Proceed to the programming phase with F1 or end with ESC.

ISAT DISPLAY 2



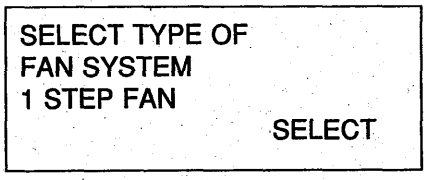
2 Specify type of gearbox.
Select using F3 or F4.

ISAT DISPLAY 3



3 Specify type of engine from V6, TURBO or NON-TURBO ENGINE.
Select using F3 or F4.

ISAT DISPLAY 4



4 Specify which type of fan system the car is equipped with. Can be 1 or 2 step fan.
Select using F3 or F4.

Programming (contd.)

ISAT DISPLAY 5

```
  PROGRAMMING
WILL NOW OCCUR
F1=OK
ESC=END
```

5 Program the instrument with the information fed in.
This is the last chance to end programming.

ISAT DISPLAY 6

```
  PROGRAMMING
CARRIED OUT
```

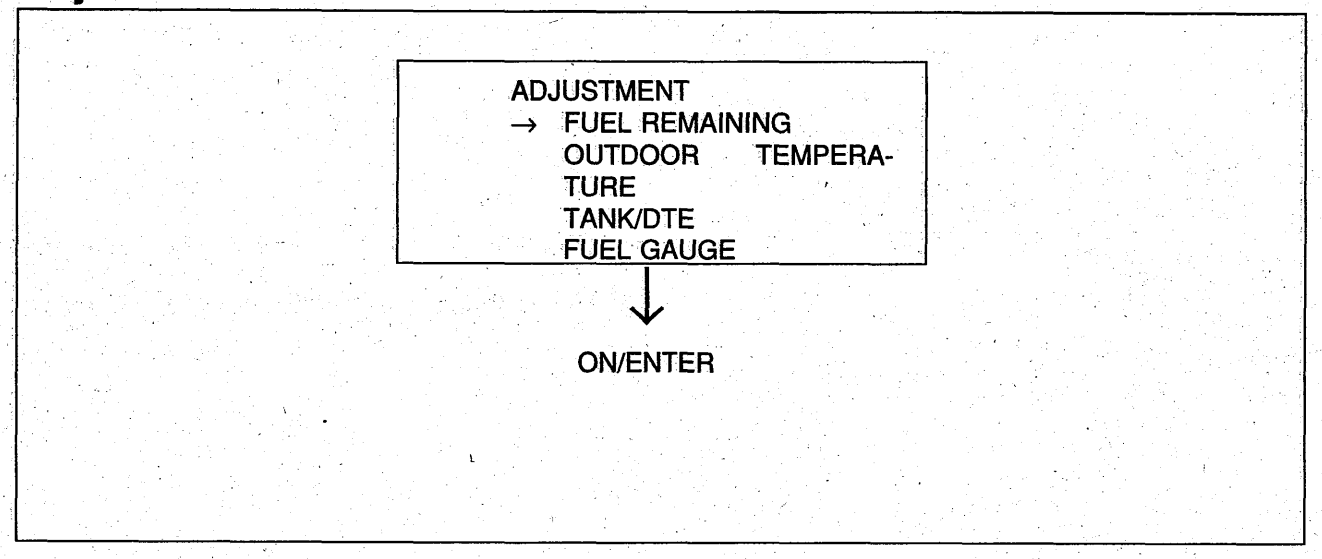
6 This menu confirms that programming has been completed.

ISAT DISPLAY 7

```
  PROGRAMMING
   INTERRUPTED
```

7 This menu is displayed if programming has been interrupted with ESC.

Adjustment



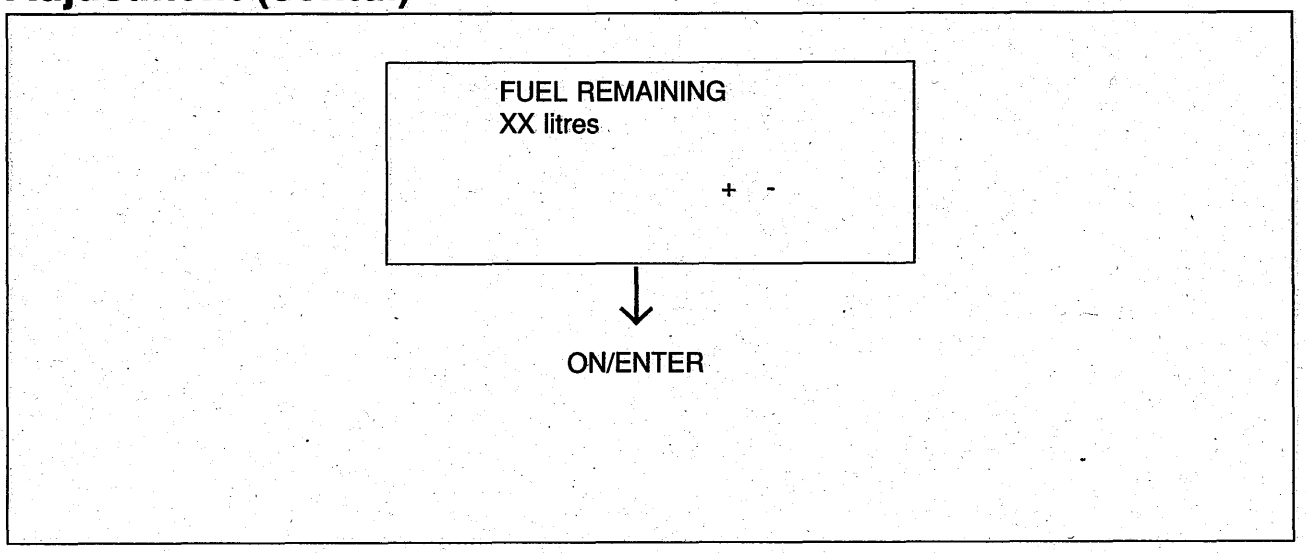
Using the ISAT, it is possible to adjust the display of a number of parameters. The ISAT reads a programmed value and presents this. If you do not wish to adjust this, end the routine with ESC.

Make a habit of switching the ignition off and then on when verifying any action.

Important

When the ISAT is carrying out adjustment, the EDU can flash and the gauges fluctuate. This is perfectly normal.

Adjustment (contd.)



FUEL REMAINING

Using the adjustment command "FUEL REMAINING", it is possible to adjust the fuel gauge offset. This means that an increase in fuel remaining moves the whole scale up/down comparatively in steps of 0.52 l (rounded to one decimal).

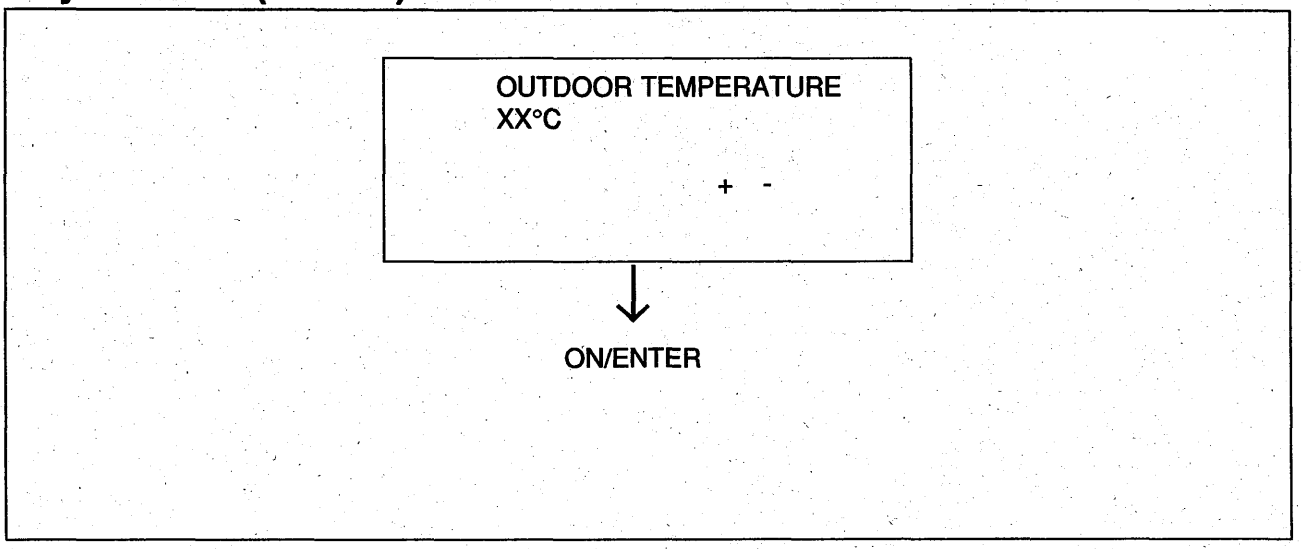
This adjustment is made when size of the deviation in the fuel gauge is the same from empty tank to full tank. When reading "TANK CONTENTS" the same change will be read that is programmed under "FUEL REMAINING".

For example: Read "TANK CONTENTS".
Result: 52 l.
Adjusting the fuel remaining: + 5l.
A new reading of "TANK CONTENTS" gives 57 l.

Important

Use this command with careful consideration.
If the display needs to be adjusted more than ±7 l, the fault is somewhere else.
Conduct fault diagnosis and remedy the fault.

Adjustment (contd.)

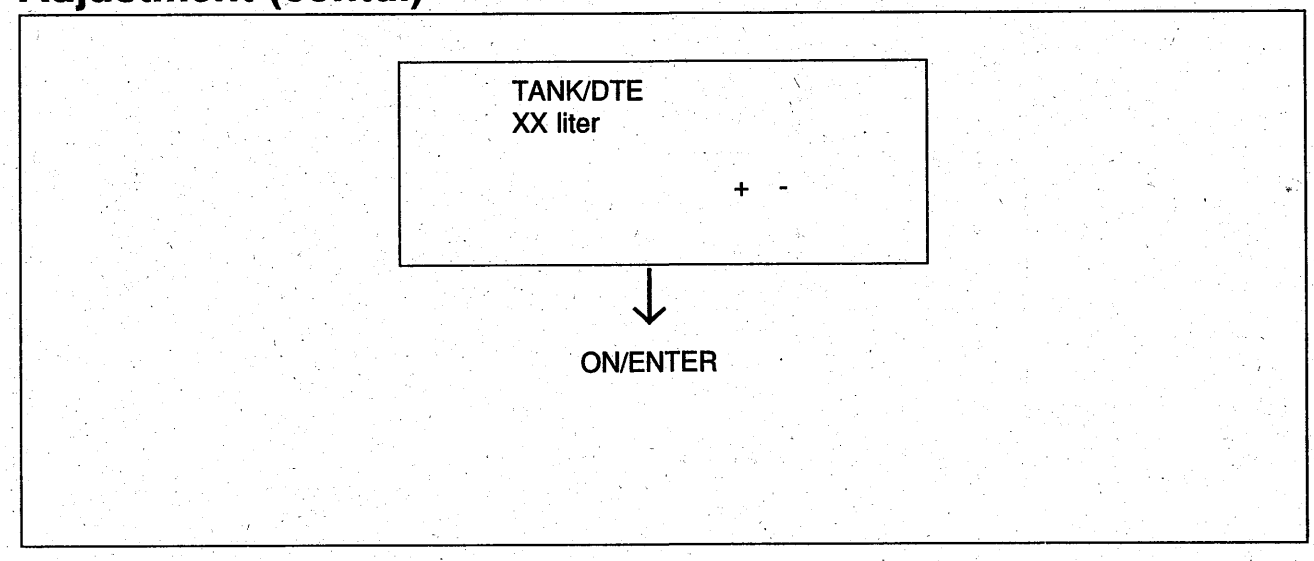


OUTDOOR TEMPERATURE

Using the adjustment command "OUTDOOR TEMPERATURE", it is possible to adjust the display of the outside temperature on the EDU display in steps of 0.35°C (rounded to one decimal).

The pre-programmed value is 0.0°.

Adjustment (contd.)



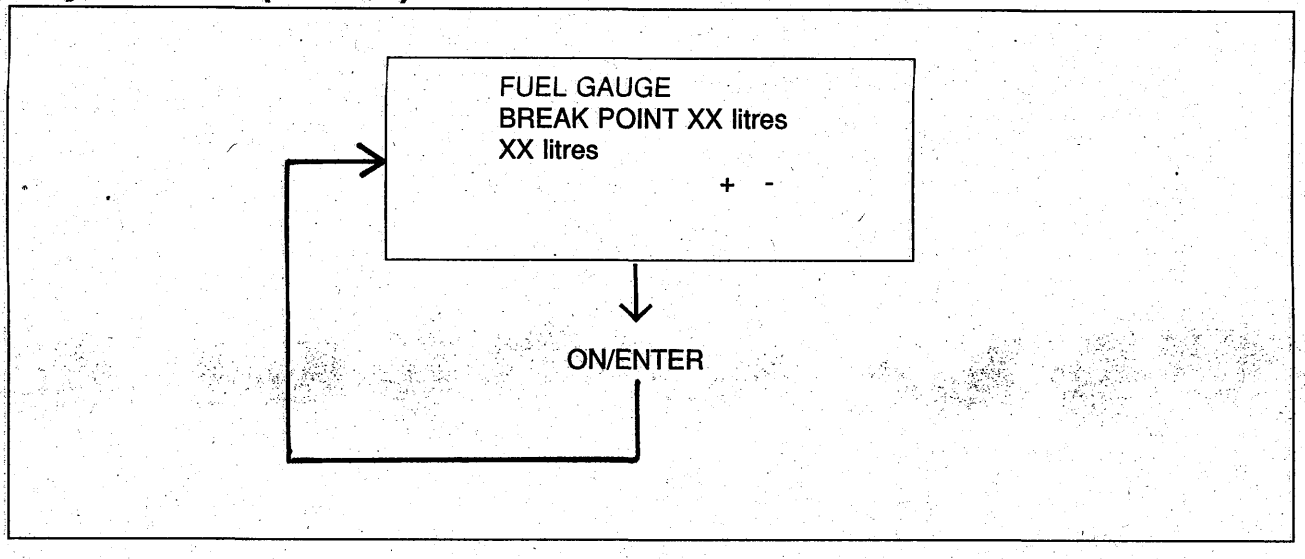
TANK/DTE

Using the adjusting command "TANK/DTE", it is possible to adjust the display of range with remaining fuel.

Example: An increase of 2 liters in TANK/DTE results in the range counter showing 0 km with 2 liters more remaining fuel than before.

The pre-programmed value is +2.0 l.

Adjustment (contd.)



FUEL GAUGE

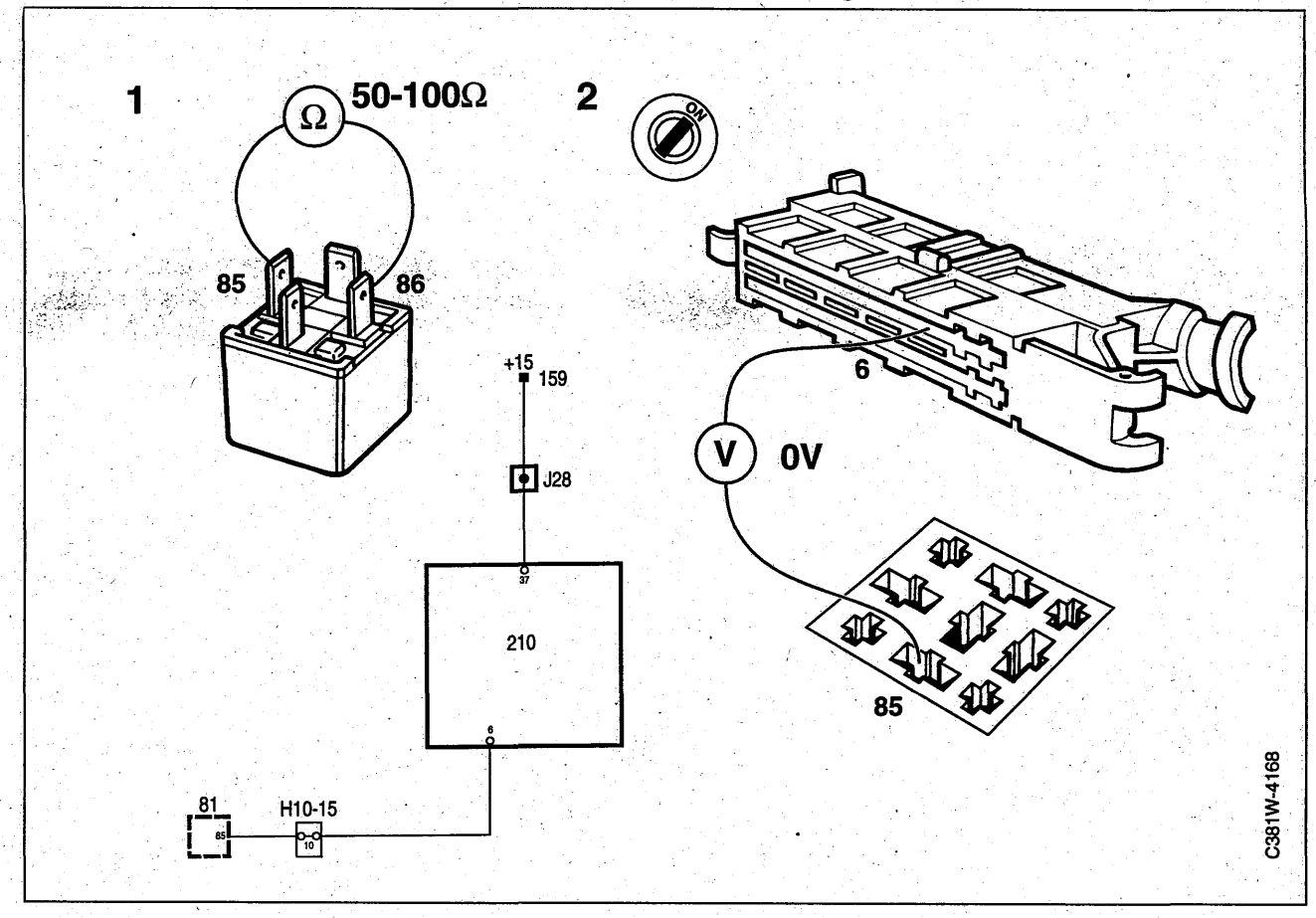
Using the adjustment command "FUEL GAUGE", it is possible to change the break points of the fuel gauge. The fuel gauge has 6 break points: 0 l, 10 l, 20 l (¼), 35 l (½), 50 l (¾) and 68 l (F).
Because the value between two break points is automatically estimated, a faulty reading in a certain interval can be remedied.

Do as follows:
- Read TANK CONTENTS with the ISAT.
- Check where the pointer is and compare.
- Activate other values with the "FUEL GAUGE" command, that is to say those values that test the whole scale.
  Use the break points.
- Note that if the error is constant over the whole scale, the "FUEL REMAINING" command should be used.
- If there is an error in one particular area, adjust the lower value.
  Example: Error in the 10 - 20 l interval.
  Adjust the 10 l break point.
- Verify the adjustment.

Example: Activate "FUEL GAUGE".
Tap in 10 l if the displayed value is 14 l.
Adjust the fuel gauge at break point 10 l to 14 l.
Verify the adjustment by activating "FUEL GAUGE".

Diagnostic trouble code B1102

Relay, radiator fan, high speed, shorted to battery positive voltage



Fault symptom

The radiator fan does not go to the 2nd step.

Action

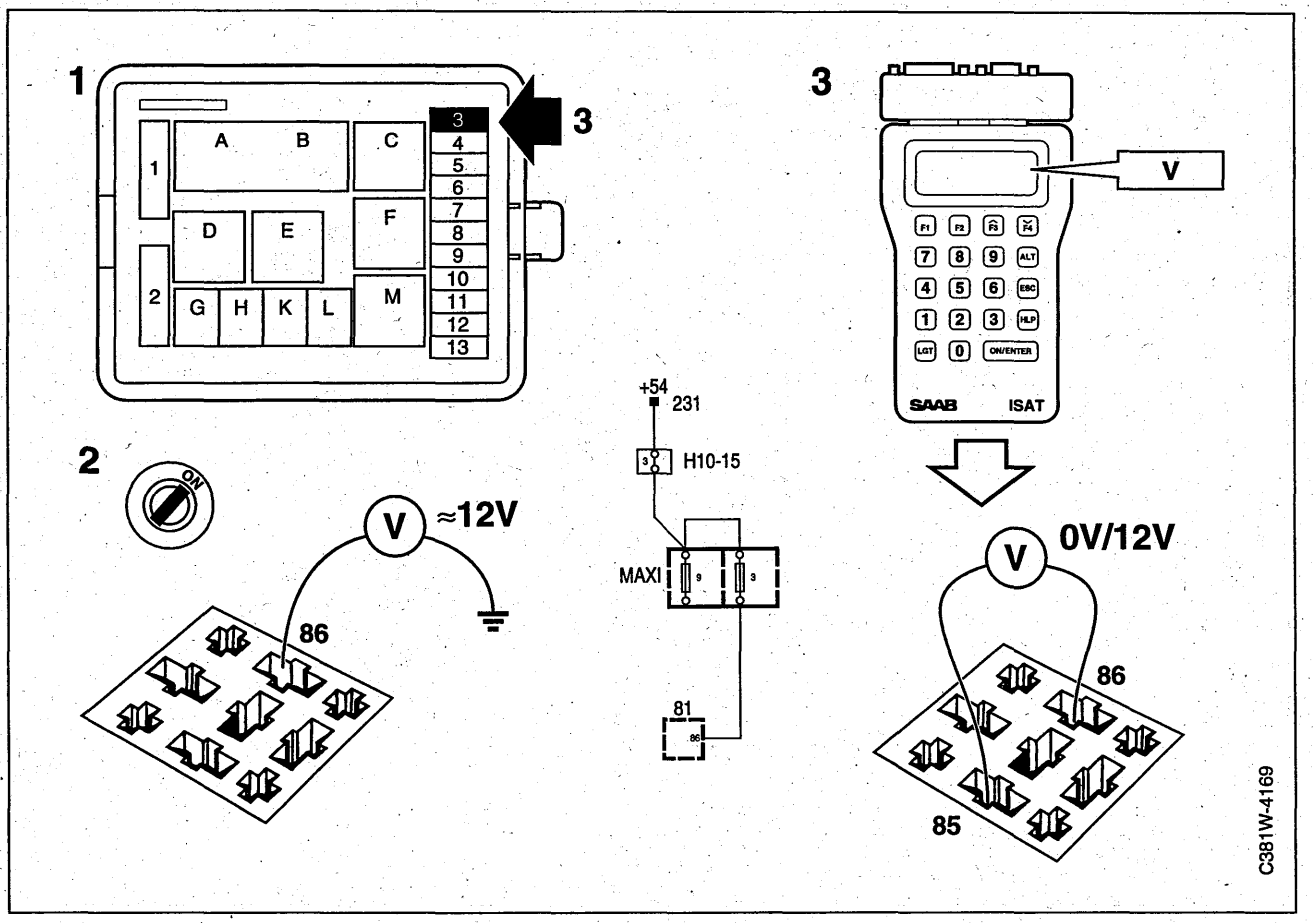
1 Remove the high speed relay and measure the resistance between 85 and 86. The resistance should be 50 - 100 Ohms. If the resistance is incorrect, change the relay.

2 Check the lead between pin 5 (relay 85) and pin 6 on the EDU control module for short circuit to battery positive voltage.

3 If the fault remains, proceed to page 92.

Diagnostic trouble code B1103

Relay, radiator fan, high speed, open circuit



Fault symptom

The radiator fan does not go to the 2nd step.

Action

1 Check fuse 3 in the electrical distribution box.

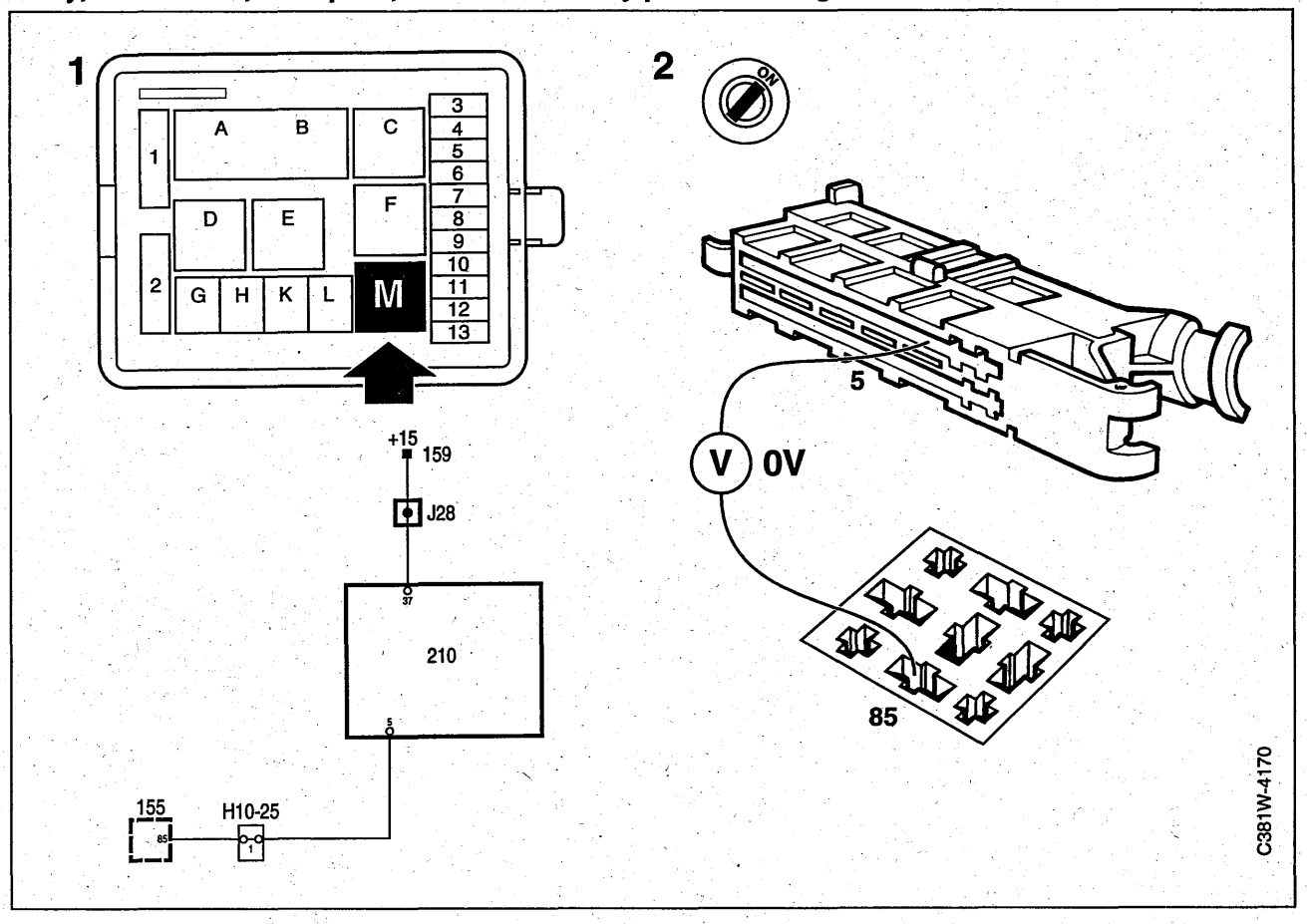
2 Remove the relay and check the voltage supply to pin 4 (relay 86). There should be battery positive voltage. If this is not the case, check the cable assembly for breaks.

3 Connect the ISAT and activate the radiator fan on high speed. Measure the voltage between 86 and 85, pins 4 and 5 respectively, with the relay removed. Use the ISAT and read the voltage with the help of a multimeter. The voltage should be
ON = BATT+
OFF = 0 V
If the measured value is correct, change the relay.
If not, check the cable assembly between connector H10-15 and the control module for open circuit.

4 If the fault remains, proceed to page 92.

Diagnostic trouble code B1104

Relay, radiator fan, low speed, shorted to battery positive voltage



Fault symptom

Radiator fan step 1 constantly active, see point 1.
Radiator fan step 1 not working, see point 2.

Action

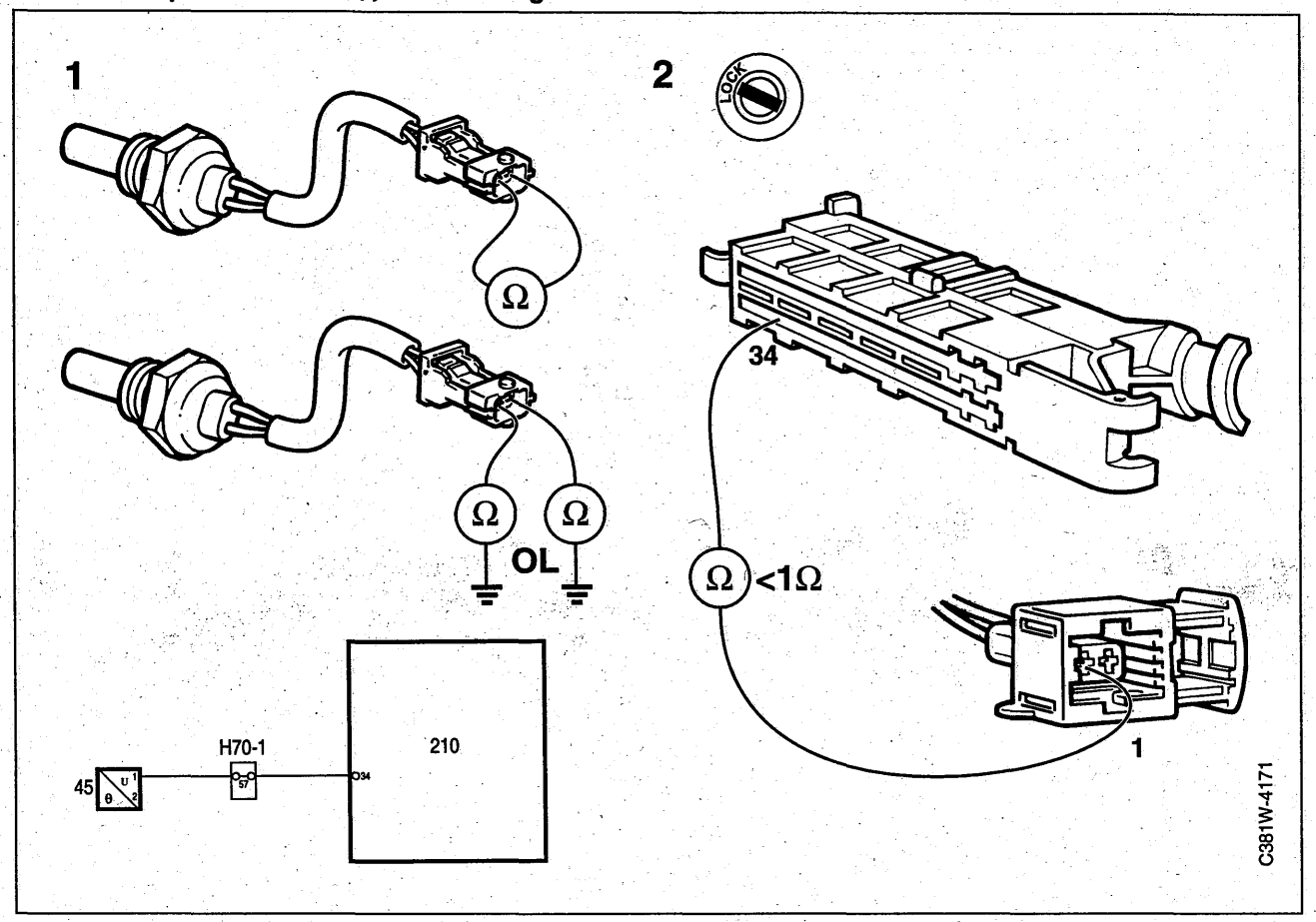
1 Change the relay.

2 Remove the relay and check the cable assembly between pin 2 on the relay holder (relay 85) and pin 5 on the control module for short circuit to battery positive voltage.
Localize and remedy the fault.

3 If the fault remains, proceed to page 92.

Diagnostic trouble code B1312

Coolant temperature sensor, shorted to ground



Conditions

A diagnostic trouble code is generated if the resistance in the resistor is under 66 Ohms or over 100 KOhms.

Fault symptom

The temperature gauge needle is at the bottom position.
The radiator fan runs continuously.

Action

1 Unplug the engine temperature sensor connector and measure the resistance between pins 1 and 2, see table. Check both pins 1 and 2 for short circuit to ground. Localize and remedy the fault.

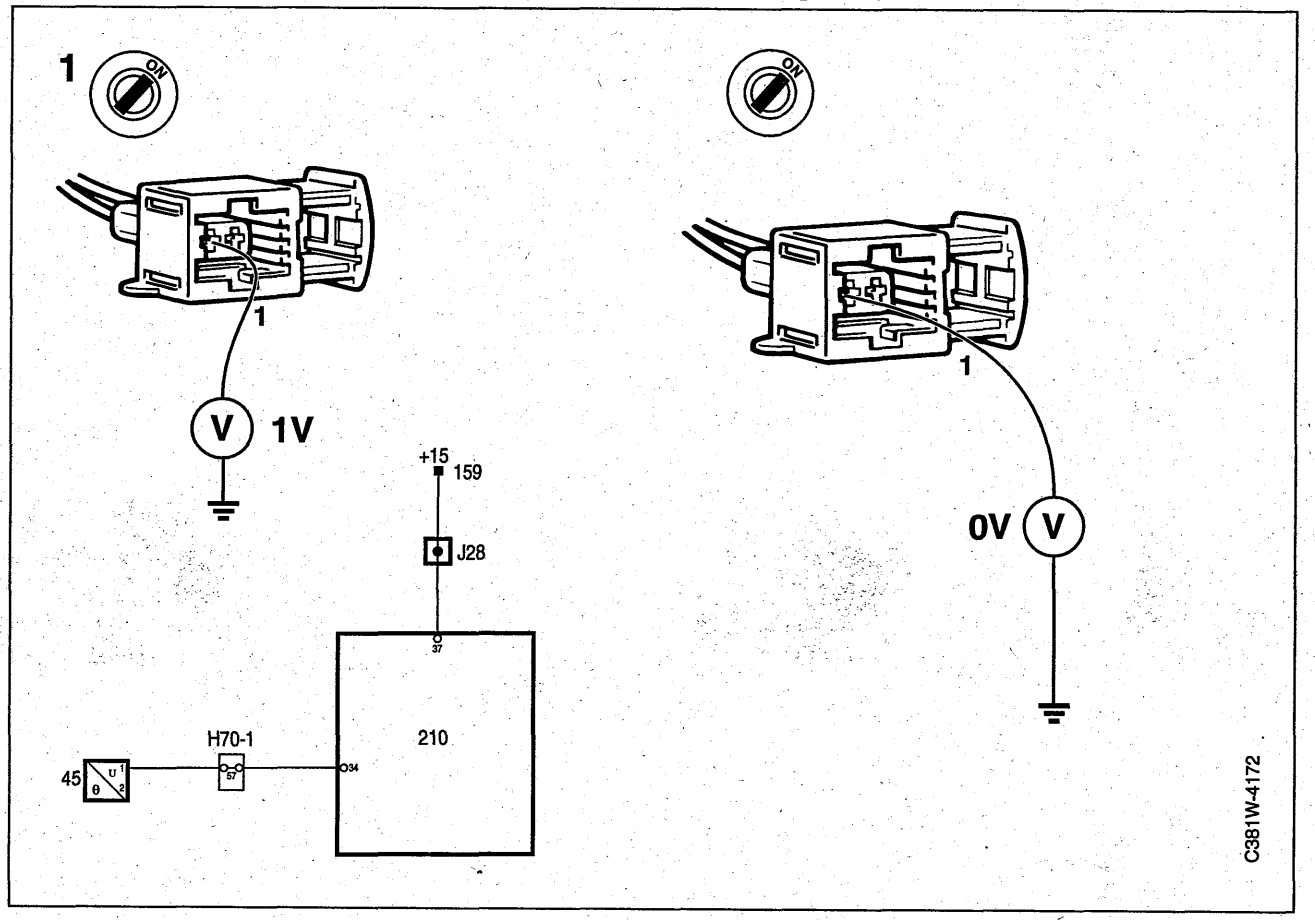
2 Unplug the connector to the EDU control module and check the cable assembly between pin 34 on the control module and pin 1 on the engine temperature sensor for short circuit to ground.

3 If the fault remains, proceed to page 92.

Resistance at 0°C (32 °F) kOhms	5,7
10°C(50°F) kOhms	3,7
20°C(68°F) kOhms	2,4
30°C(86°F) kOhms	1,6
60°C(140°F) Ohms	570
80°C(176°F) Ohms	300
100°C(212°F) Ohms	180
110°C(230°F) Ohms	140
120°C(248°F) Ohms	110

Diagnostic trouble code B1313

Coolant temperature sensor, shorted to battery positive voltage



Fault symptom

The temperature gauge needle is at the bottom position.
The radiator fan runs continuously.

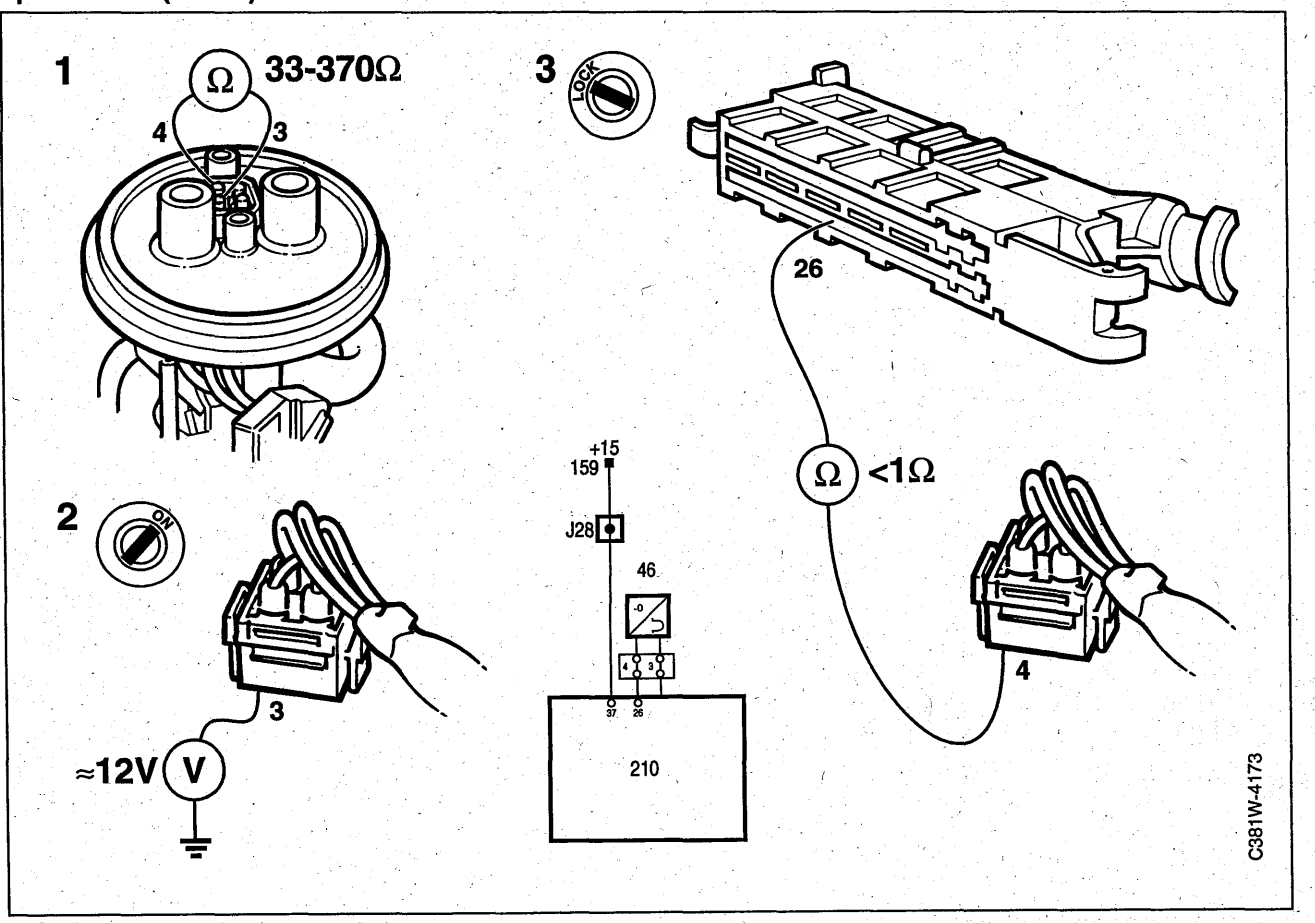
Action

1 Unplug the engine temperature sensor connector. Switch on the ignition and measure the voltage between pin 1 on the connector and ground. The voltage should be about 1 V.
If the voltage is higher, unplug the connector from the control module and repeat the measurement.
If there is voltage, investigate the lead for short circuit to battery positive voltage.

2 If the fault remains, proceed to page 92.

Diagnostic trouble codes B1722 and B1723

Fuel level sensor,
shorted to ground (B1722)
open circuit (B1723)



Fault symptom

Fuel gauge shows zero.
The fuel warning lamp is lit.
The range arrow flashes.

Action

1 Unplug the tank unit connector and check the resistance between tank unit pins 3 and 4.
The resistance should be 25 - 370 Ohms.
If the resistance is incorrect, change the fuel level sensor.

2 If the resistance is correct, check the voltage on pin 3 in the connector to the tank unit. The instrument should show battery positive voltage.
If the voltage is incorrect, check the cable assembly for open/short circuit to ground. Localize and remedy the fault.

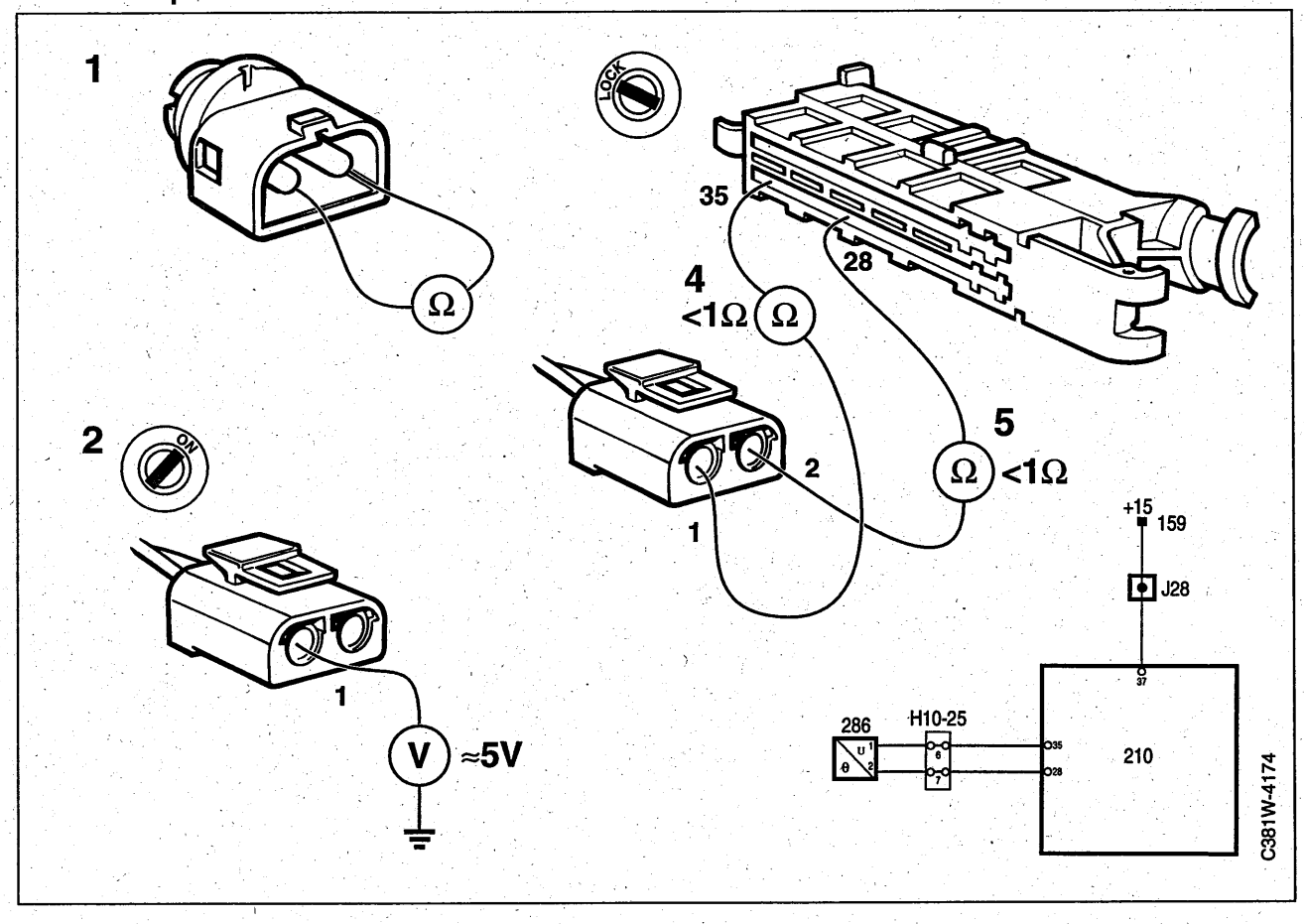
3 Check that pin 4 in the connector to the tank unit is grounded by measuring between pin 4 in the connector to the tank unit and pin 26 on the EDU control module connector. If the instrument shows a resistance, there is a break in the lead. Localize and remedy the fault.

4 If the fault remains, proceed to page 92.

> ⚠ **WARNING**
>
> Make sure that the locking pin for the fuel connections to the pump is fitted.
> Otherwise, the fuel connections can become detached and gasoline spray out when the engine is started.

Diagnostic trouble code B1745

Outside temperature sensor



Fault symptom

B1745: Outside temperature not displayed

B1746: Diagnostic trouble code i ACC:
Outside temperature sensor open/short circuit

Action

1 Unplug the temperature sensor connector. Check the resistance in the outside temperature sensor with the connector unplugged. The resistance varies with temperature, see table.
If the value is incorrect, change the sensor.

2 Check the leads by measuring the voltage at pin 1 on the connector (5V). If there is no voltage, check pin 35 on the control module with the connector plugged in.
If there is no voltage, proceed to page 92.
If there is voltage, unplug the 39 pin connector and check the lead between pins 35 and 1 on the sensor for open circuit. Localize and remedy the fault.

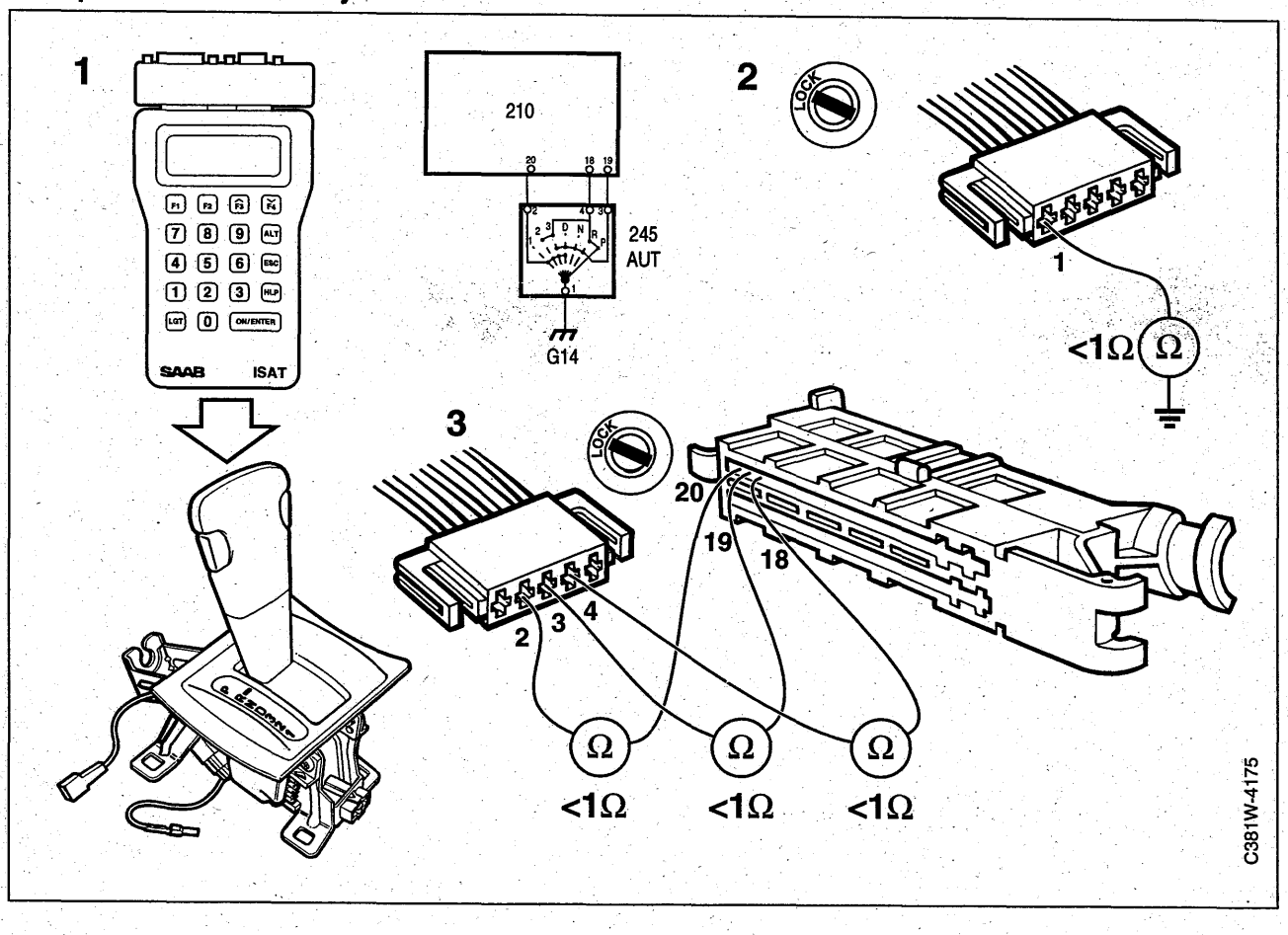
3 Check the lead between pin 28 on the control module and pin 2 in the connector for open circuit.

Resistance at 0°C(32°F)	kOhms	5,8 - 6,2
10°C(50°F)	kOhms	3,8 - 4,1
20°C(68°F)	kOhms	2,5 - 2,8
30°C(86°F)	kOhms	1,7 - 1,9
40°C(104°F)	kOhms	1,2 - 1,4

4 If there is no fault in the lead, proceed to page 92.

Diagnostic trouble code B1775

Gear position sensor faulty



Fault symptom

No gear position displayed.
Incorrect gear position displayed.

Action

1 Connect the ISAT, select "READ VALUES" and study the transmission range switch values.
The ISAT shows voltage on the sensor in question. This should be ON 0 V or OFF 12 V.
Select read "SELECTOR LEVER POS". The display shows the gear selected.
Check that the ISAT display corresponds to the selected transmission range switch, see table.
If all signals are OFF 12 V, see point 2.
If individual signals are faulty, see point 3.

2 Check the lead between transmission range switch connector pin 1 and grounding point G14.

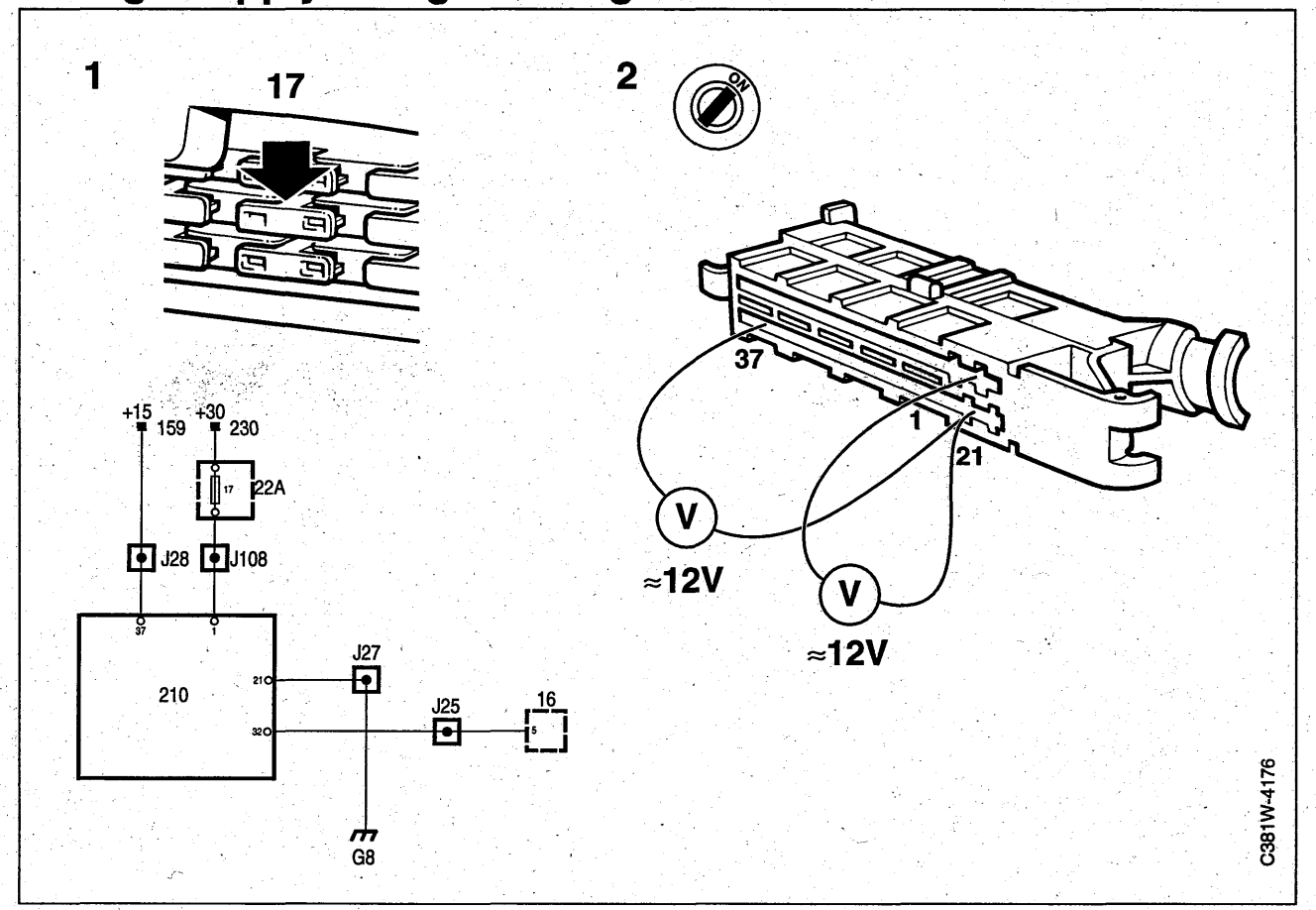
3 Check the cable assembly from EDU control module connector pins 18, 19 and 20 to transmission range switch connector pins 2, 3 and 4 for open/short circuits.

4 If the fault remains, change the transmission range switch.

	Pin		
	18	19	20
	A	B	C
Transmission range			
P	ON 0 V	OFF 12 V	OFF 12 V
R	ON 0 V	ON 0 V	OFF 12 V
N	OFF 12 V	ON 0 V	OFF 12 V
D	OFF 12 V	ON 0 V	ON 0 V
3	ON 0 V	ON 0 V	ON 0 V
2	ON 0 V	OFF 12 V	ON 0 V
1	OFF 12 V	OFF 12 V	ON 0 V
Manual gearbox	OFF 12 V	OFF 12 V	OFF 12 V

OFF 12 V = open circuit
ON 0 V = closed circuit

Voltage supply and grounding connections



Fault symptom

Display blank.

Temperature and fuel gauges in bottom position, see points 1 and 2.

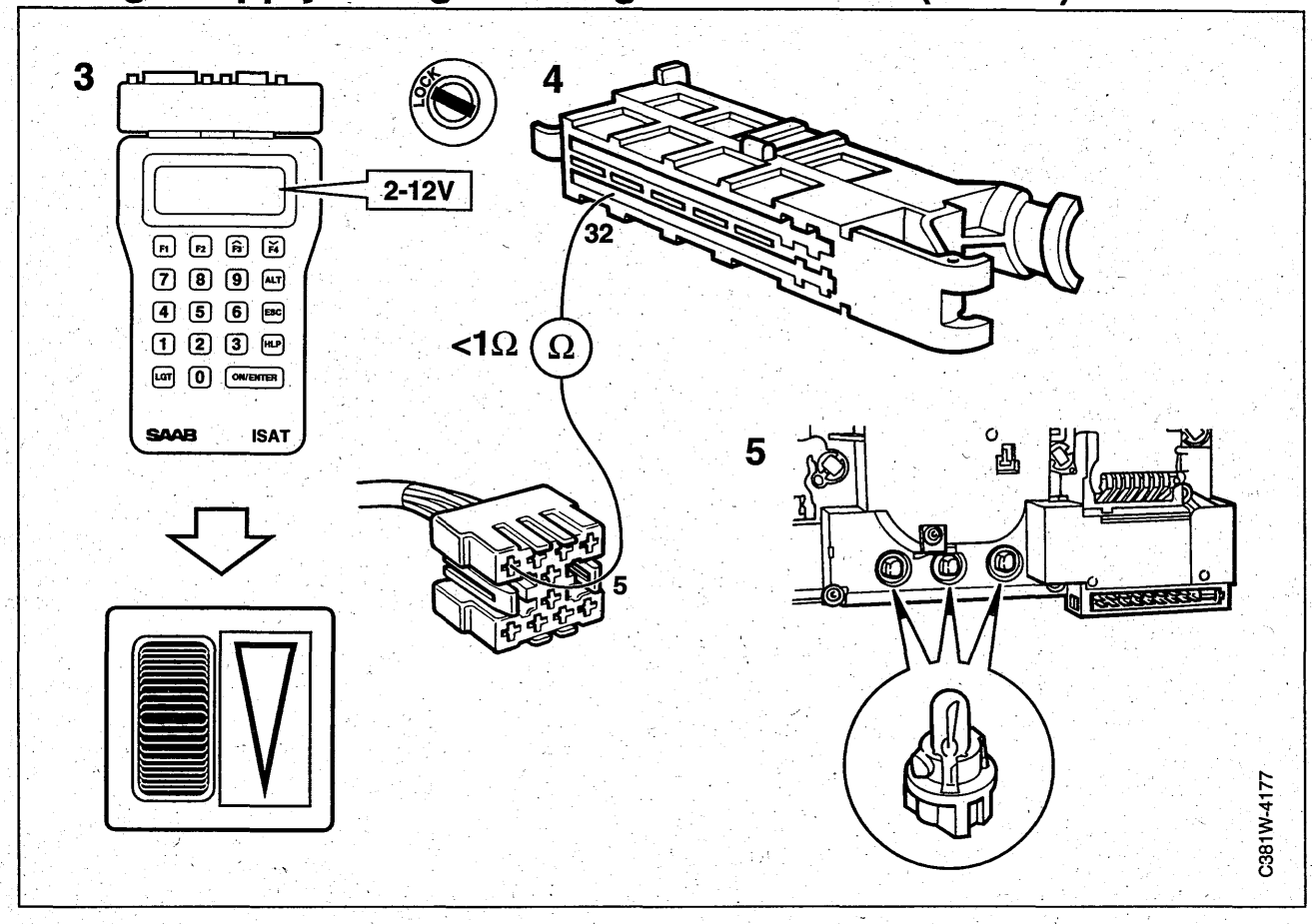
Temperature and fuel gauges working, see points 3, 4 and 5.

Action

1 **If the display is blank:** Check that it is not switched off.
Check fuse 17 for +30.

2 With the ignition on, check that there is voltage (battery positive voltage) between
pins 1 and 21 (+30), and
between pins 37 and 21 (+15).
If not, check the leads between the control module and the fuse and between the control module and the grounding point for open/short circuit.

Voltage supply and grounding connections (contd.)

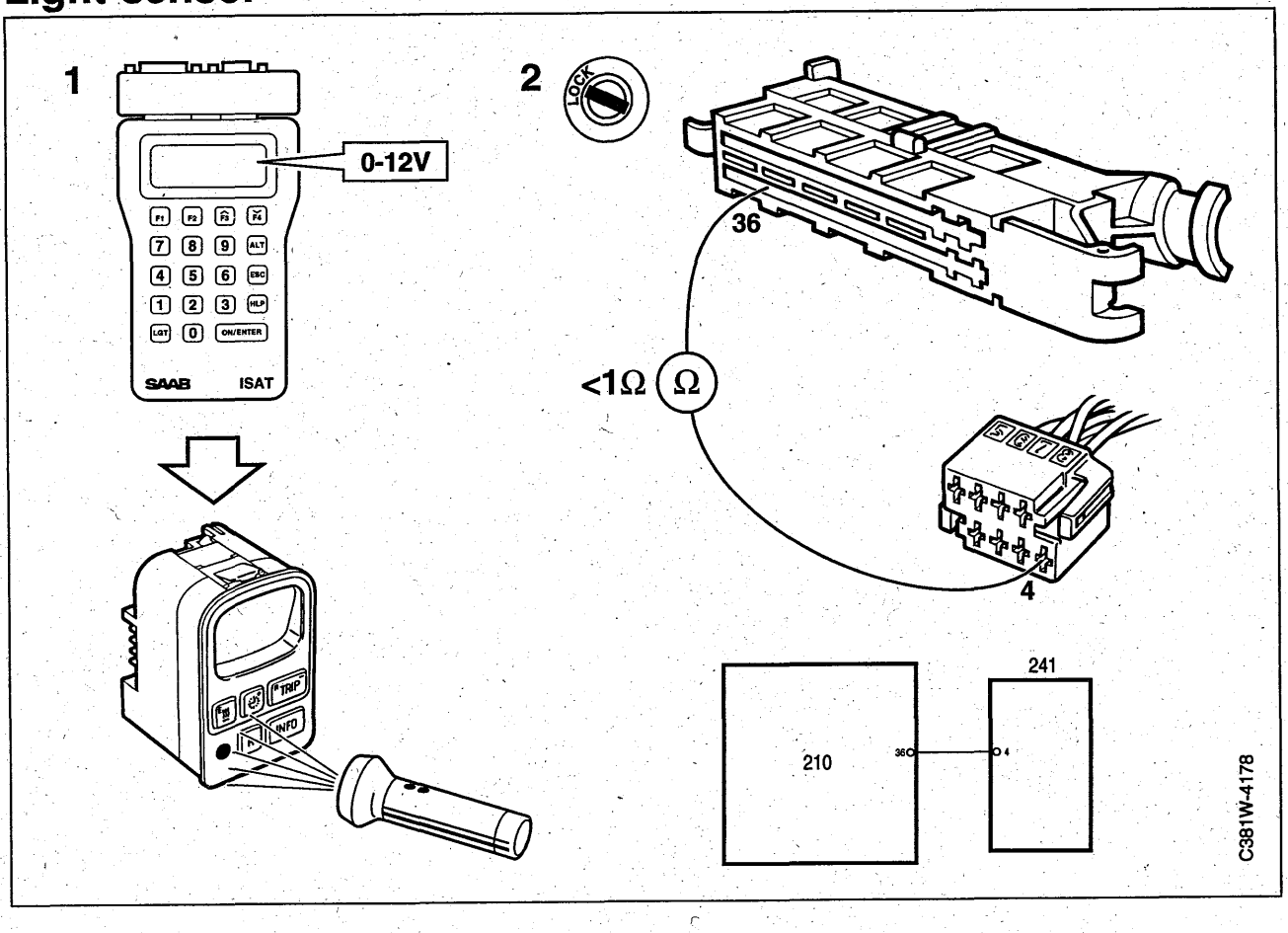


3 Connect the ISAT and activate the lamps in the EDU display in the ACTIVATE menu.
If the lamps light, see point 4.
If the lamps do not light, see point 5.

4 Connect the ISAT and read "RHEOSTAT VALUE".
Switch on the ignition and lights.
With the rheostat in the min. position: 13% (approx. 2 V)
With the rheostat in the max. position: 100% (approx. battery positive voltage)
If no voltage is measured to the EDU via the rheostat, check the voltage supply to the rheostat. Check the lead between rheostat pin 5 and EDU control module pin 32.
Remedy any faults and erase any diagnostic trouble codes in the control module.

5 Check the EDU lamps.
If the fault remains, proceed to page 92.

Light sensor



Fault symptom

Dim display in strong sunlight.

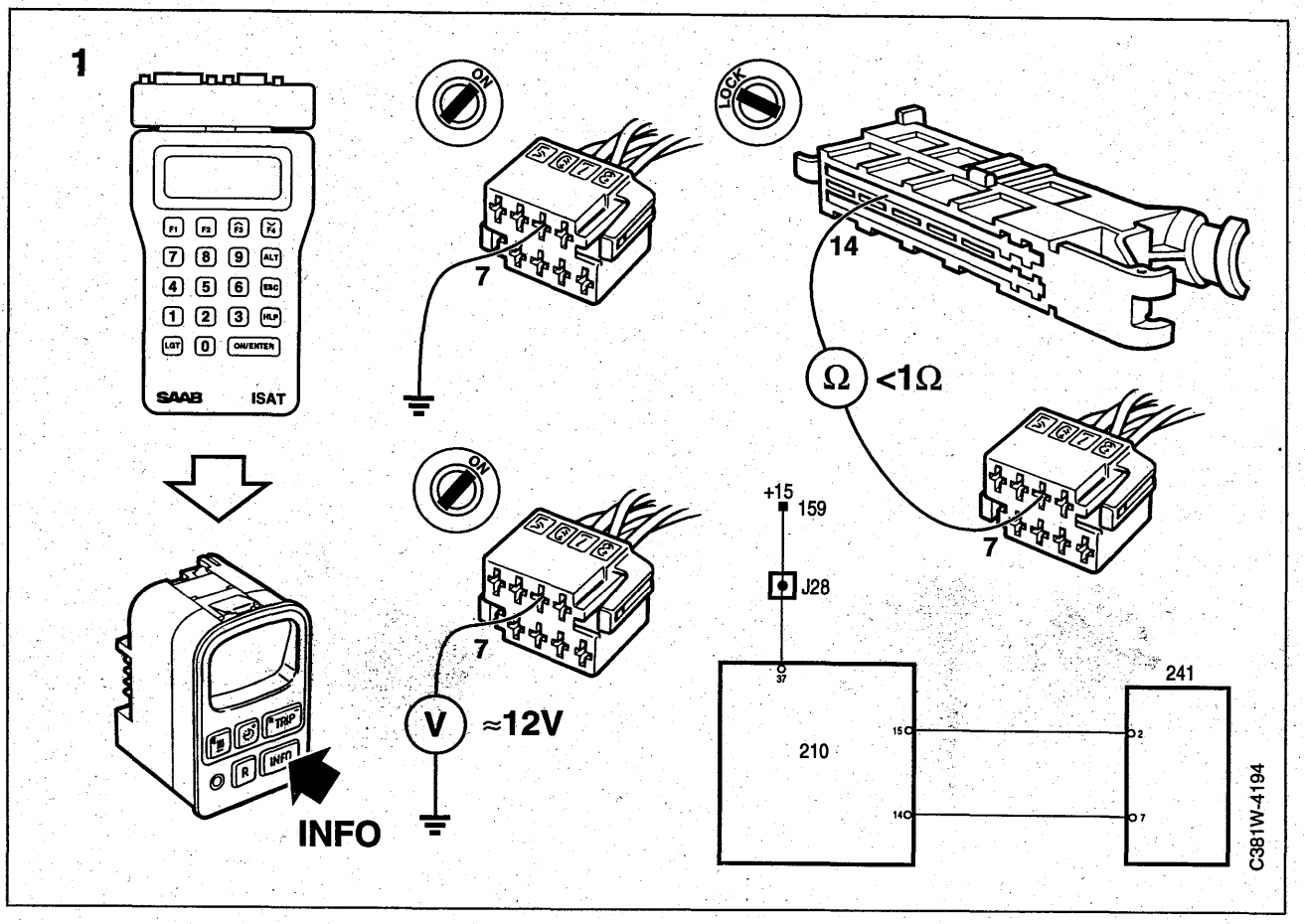
Action

1 Connect the ISAT, select "LIGHT SENSOR VALUE" under "READ VALUES".
The ISAT shows the light sensor value in V. The desired values are
min. light strength, approx. 0 V
max. light strength, approx battery positive voltage
Illuminate the light sensor with a pocket lamp and read the value on the ISAT. The voltage should increase as the display light strength increases.
If there is no change on the ISAT or the display, see point 2.
The light sensor value in ISAT changes, but not the lighting, see point 3.

2 Check the lead between control module pin 36 and light sensor pin 4. If there is no fault in the lead, the fault is probably in the light sensor. Change the clock/SCC.

3 If the fault remains, proceed to page 92.

INFO and R buttons



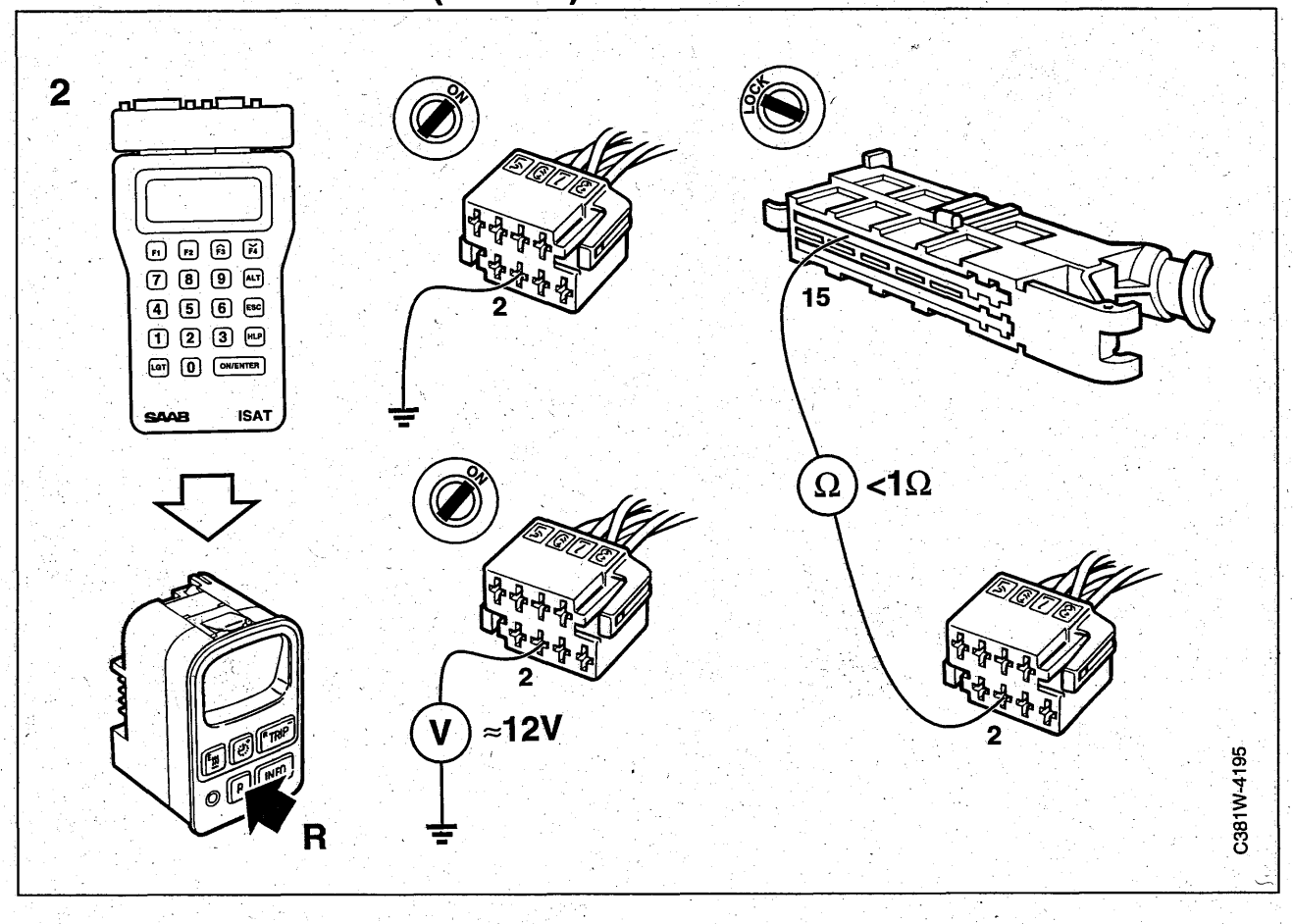
Fault symptom

The control module does not respond when the INFO button is pressed, see point 1.
The control module does not respond when the R button is pressed, see point 2.

Action

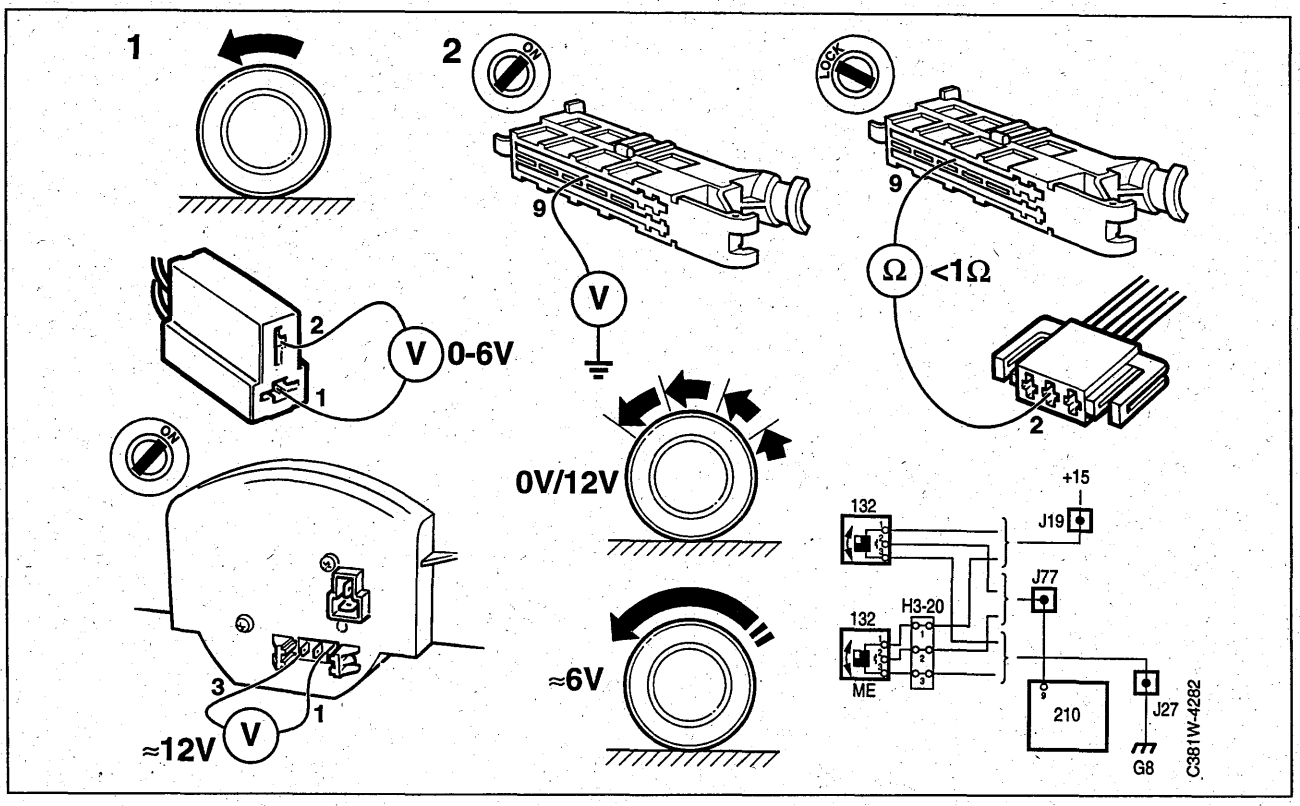
1 Connect the ISAT and read "INFO BUTTON".
When the INFO button is pressed, the display response should be INFO BUTTON ON.
If not, unplug the 8 pin connector from the clock/SCC and ground pin 7. Read ISAT again.
If the display response is INFO BUTTON ON, change the clock/SCC.
If the display response is INFO BUTTON OFF, the measured voltage between pin 7 in the connector and ground should be battery positive voltage.
If not, check the lead between pin 14 on the control module and pin 7 in the connector for open circuit.
If the fault remains, proceed to page 92.

INFO and R buttons (contd.)



2 Connect the ISAT and read "RESET BUTTON". When the RESET button is pressed, the display response should be RESET BUTTON ON.
If not, unplug the 8 pin connector from the clock/SCC and ground pin 2. Read the ISAT again.
If the display response is RESET BUTTON ON, change the clock/SCC.
When the display response is RESET BUTTON OFF, the measuring voltage on pin 2 in the connector and ground should be battery positive voltage.
If not, check the lead between pin 15 on the control module and pin 2 in the connector for open circuit.
If the fault remains, proceed to page 92.

Fuel consumption



> ⚠ **WARNING**
>
> If the drive wheel has to be raised (to bring about speed signals), the necessary safety precautions must be observed.
> This is to prevent the wheel coming into contact with the floor or loose equipment.

To ensure that the test is performed correctly, the engine should be running and a gear should be engaged.

Fault symptom 1

Selected on display:

L/km

The current fuel consumption is displayed at maximum (99.9) when driving.

MPG

The current fuel consumption is displayed as minimum (99.9) while driving.

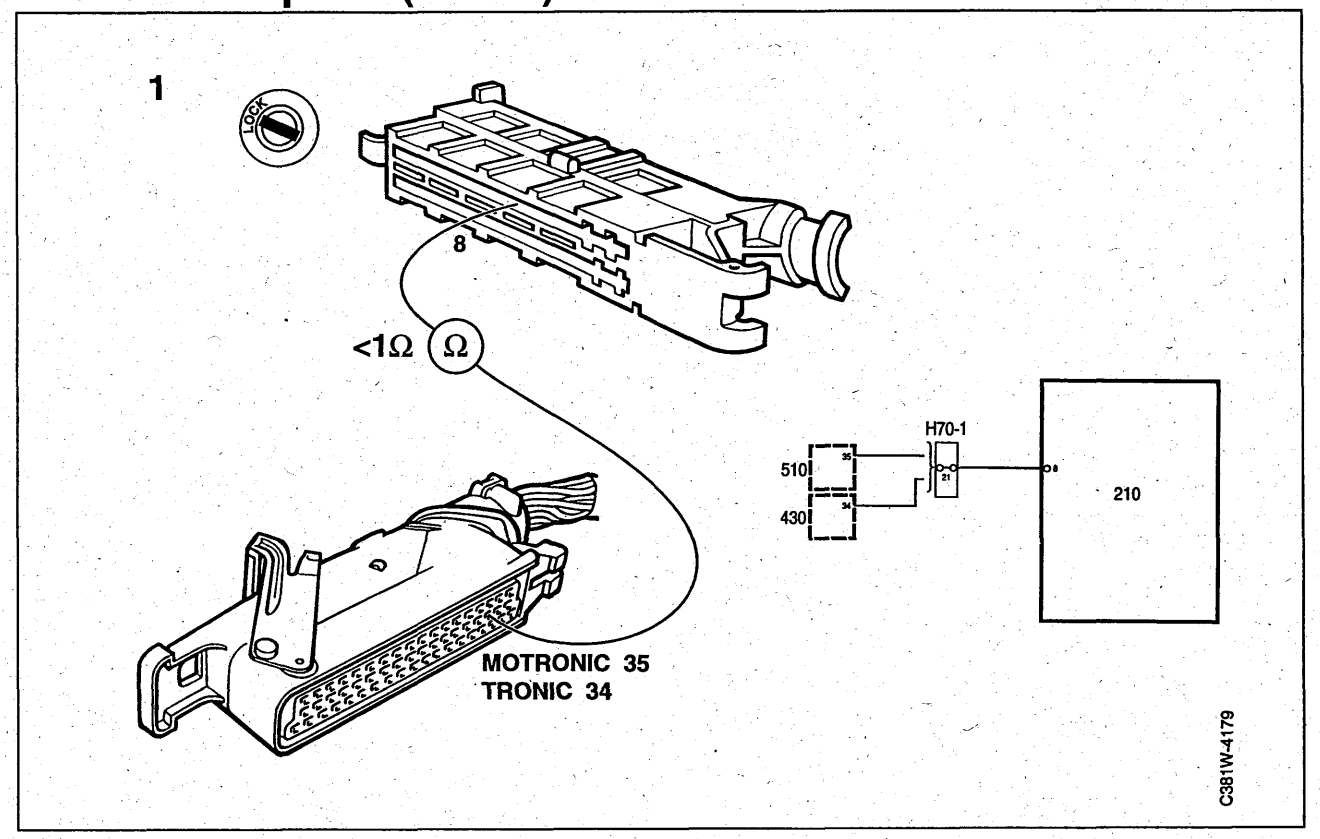
Action

1 Check that the speedometer is working. If it is, see point 2.
If not, unplug the 2 pin speedometer connector. Measure the speed signal from the sensor (AC volts). The meter should show 0 - 6 V as the speed increases.
The measuring voltage between pin 1 (battery positive voltage) and pin 3 (ground) on the 3 pin speedometer connector, with the ignition on, should be battery positive voltage.
If not, check the cable assembly for open/short circuits.
If there is voltage, the speedometer is faulty.

2 Measure the speed pulses at the EDU control module (pin 9) with the engine running and the drive wheel either rotating or stationary.
To achieve this, apply the foot brake to stop the driven wheels, then release the brake pedal and let the driven wheels rotate again. Repeat this procedure until a reading is obtained.
The value should be 0 or 12 V DC (stationary wheel) depending on the stop position on the sensor, and 6 V DC (rotating wheel).
If not, check the lead between pin 9 on the EDU and pin 2 on the speedometer for open/short circuit.

3 If there is voltage, proceed to page 92.

Fuel consumption (contd.)



Fault symptom 2

Selected on display:

L/km

Current fuel consumption shows minimum (0).

MPG

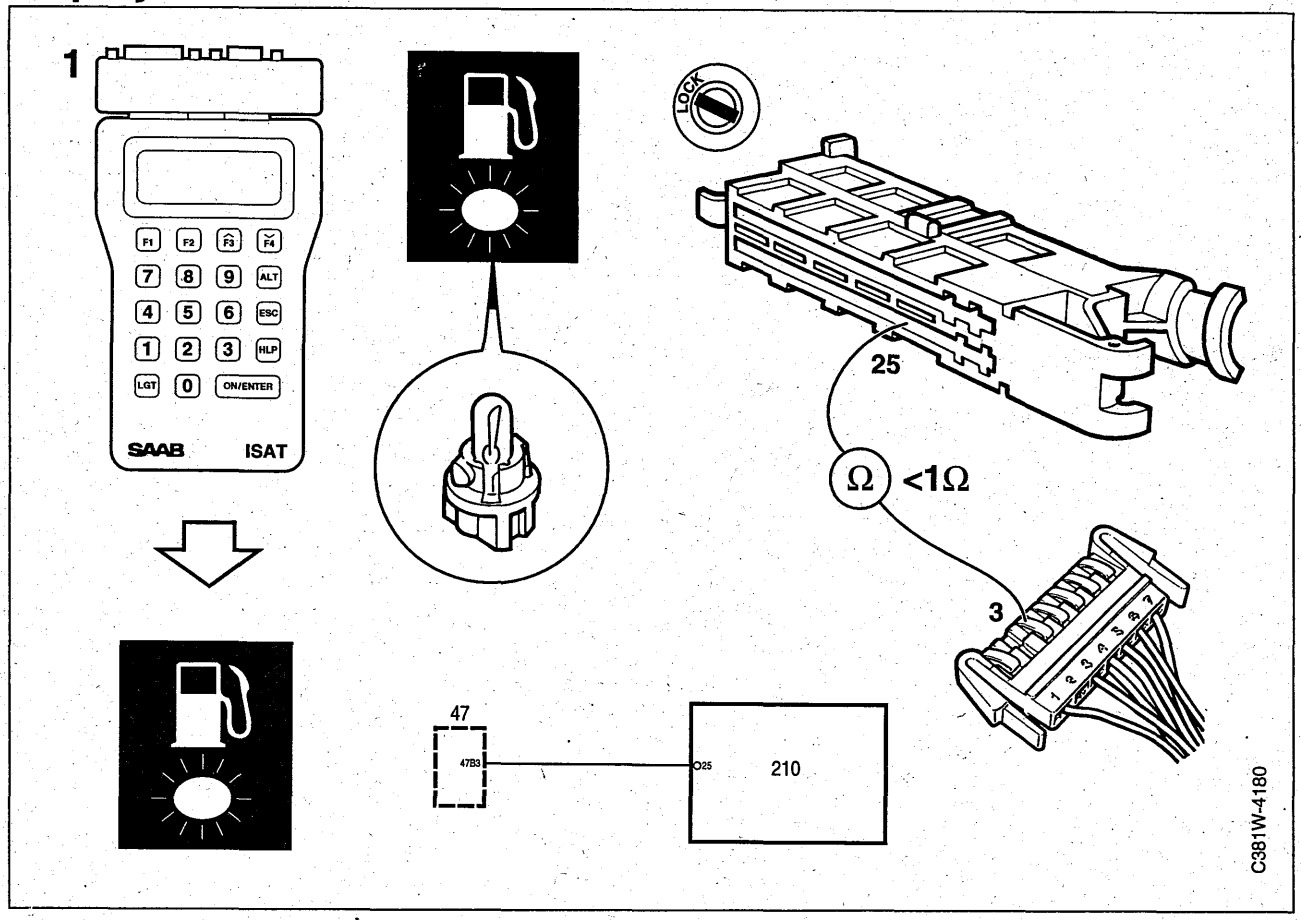
Current fuel consumption shows maximum (0).

Action

1 **Cars with Motronic:**
Check the cable assembly between pin 35 on the Motronic control module and pin 8 on the EDU control module for open/short circuit to ground.
Cars with Trionic:
Study the output signal on Trionic control module pin 34. The correct value is 7.5 Hz/2.5 ms.

2 If the fault remains, proceed to page 92.

Fuel level and range display



Fault symptom

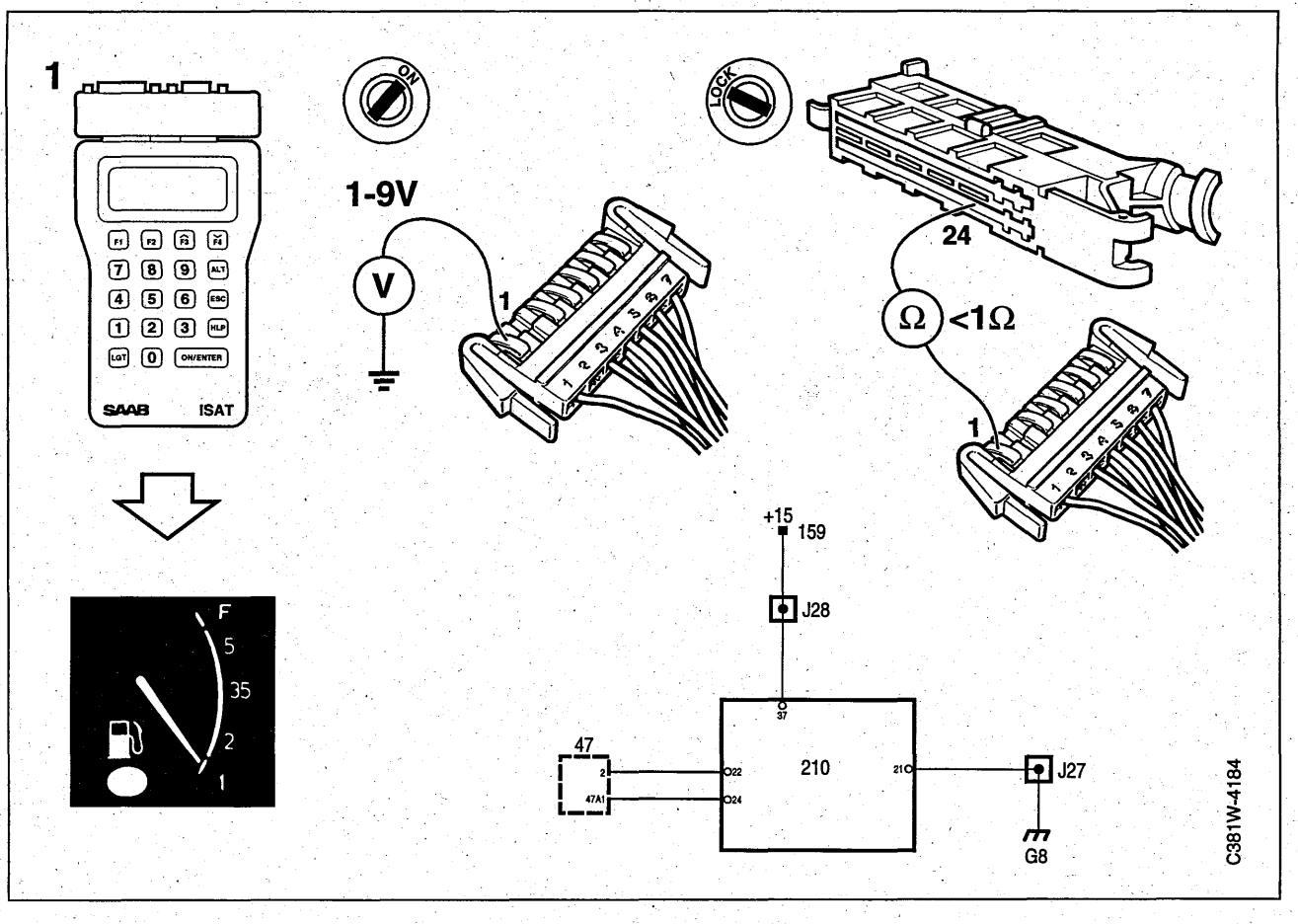
Fuel warning lamp does not light or
is lit continuously.
Fuel gauge normal.

Action

1 Connect the ISAT and activate "EMPTY TANK LAMP".
Switch the lamp on and off.
If the lamp does not work
- check the lamp (pin 25)
- check the cable assembly (pin 3)

If the lamp is lit continuously
- check the lead between the lamp (pin 3) and the EDU control module (pin 25) for short circuit to ground
- if the fault remains, proceed to page 92.

Fuel level



Fault symptom

The fuel gauge shows zero, the range indicator is normal and the fuel level sensor signal is correct (read tank contents using ISAT), see point 1.

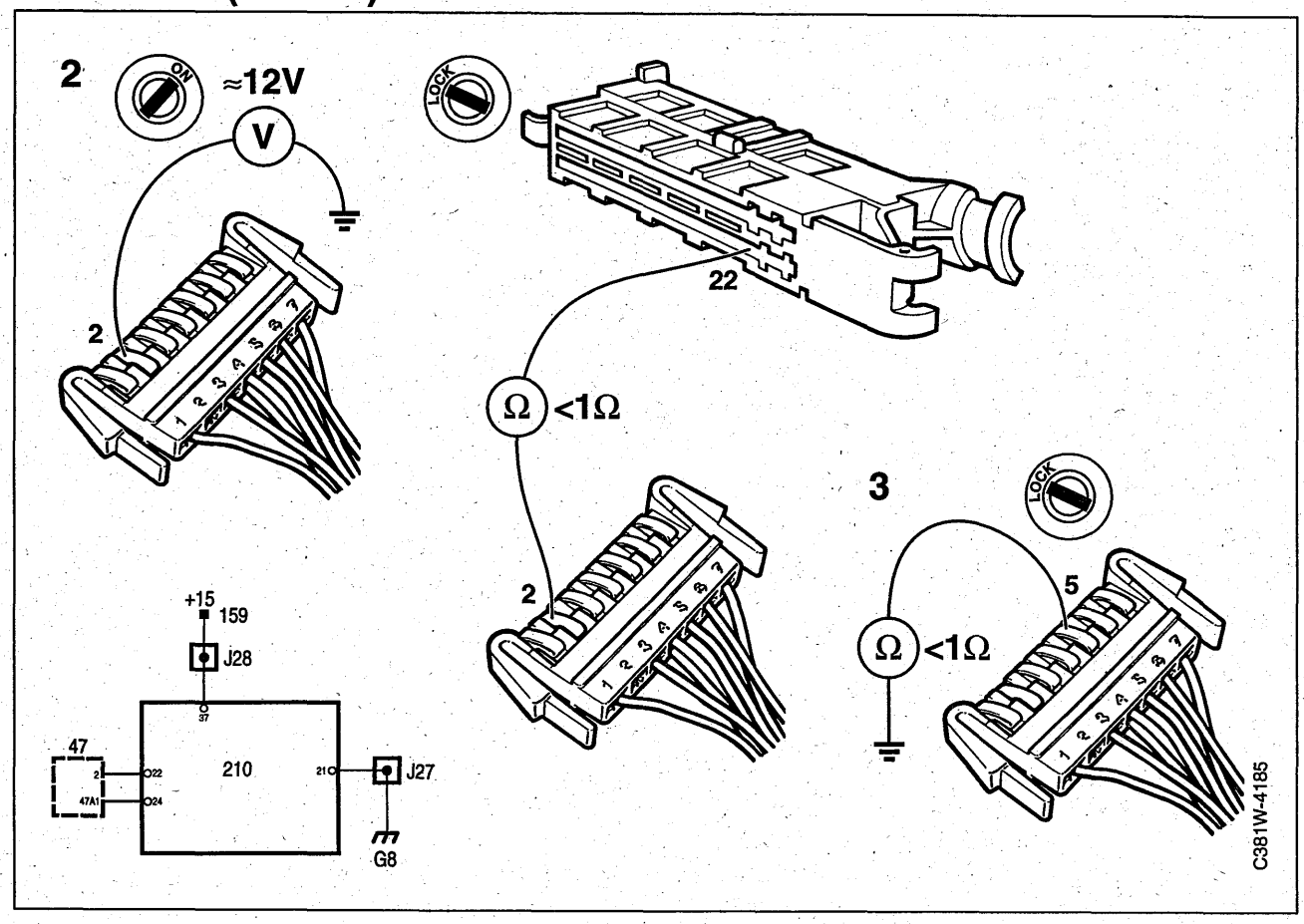
Fuel gauge/temperature gauge in max position, range meter normal and fuel level sensor signal correct (read tank contents using ISAT), see point 2.

Fuel meter/temperature meter in min. position. Rheostat in min. position (light on) causes the right-hand direction indicator lamp to "glow". Rheostat in max. position causes the right-hand direction indicator lamp to light brightly. The temperature gauge moves about 5 mm when the rheostat is changed from min. to max., see point 3.

Action

1 Connect the ISAT, activate "FUEL GAUGE" and check that those values programmed in liters in ISAT correspond with the fuel gauge display.
Unplug the connector from the back of the fuel gauge and measure the voltage between pin 1 and ground.
With the ignition on, the voltage should be between 1 V (empty tank) and 8.25 V (full tank). If there is a voltage between about 1 - 8.25 V, the fault is in the fuel gauge and this should be changed.
If there is no voltage, test between pin 1 on the instrument and pin 24 on the EDU control module for open/short circuit.
If the fault remains, proceed to page 92.

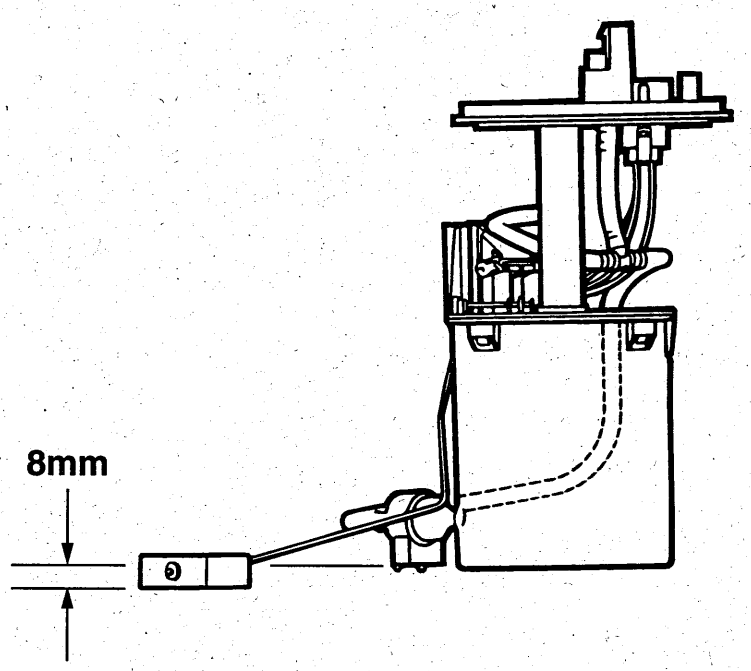
Fuel level (contd.)



2 Unplug the connector from the back of the fuel gauge. Measure the voltage between pin 2 and ground. This should be 1 V under battery positive voltage.
If there is voltage, change the fuel gauge.
If there is no voltage, check the cable assembly between pin 22 on the control module and pin 2 on the fuel gauge connector for open/short circuit.
If the fault remains, proceed to page 92.

3 Check the lead between pin 5 on the fuel gauge connector and grounding point G8.

Checking the fuel gauge float arm position



C381W-4181

Important

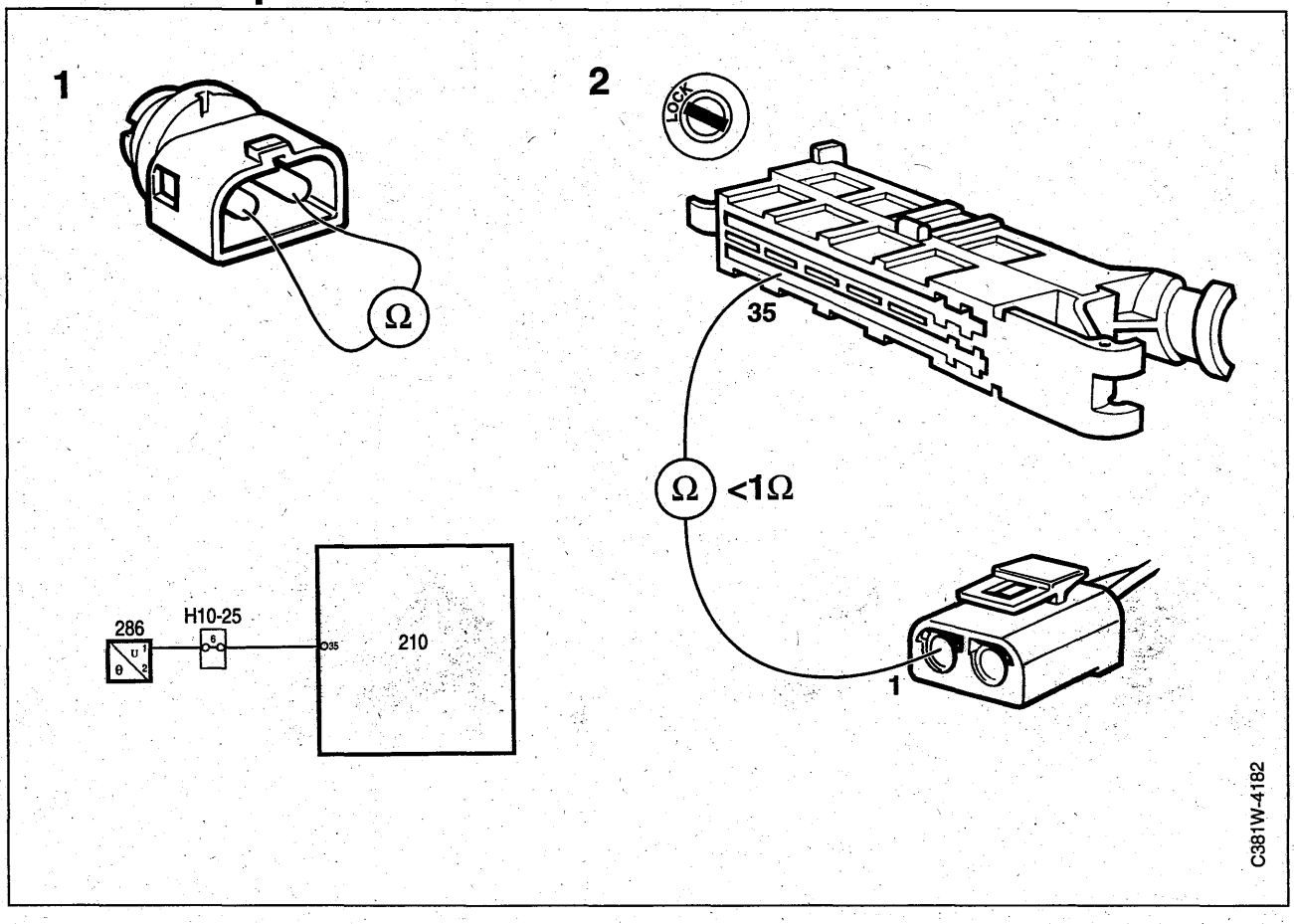
It is advisable to test the resistance of the fuel level sensor before the fuel pump is removed.

With the fuel pump placed on a flat surface, the distance between the surface and underside of the float arm should be
8 mm below the surface.

Transmitter resistance should be:

Empty tank, float in lowest position 25-40 Ohms
Full tank, float in highest position 360-380 Ohms.

Outside temperature sensor



Fault symptom

Permanent high temperature reading (+50°C).

Action

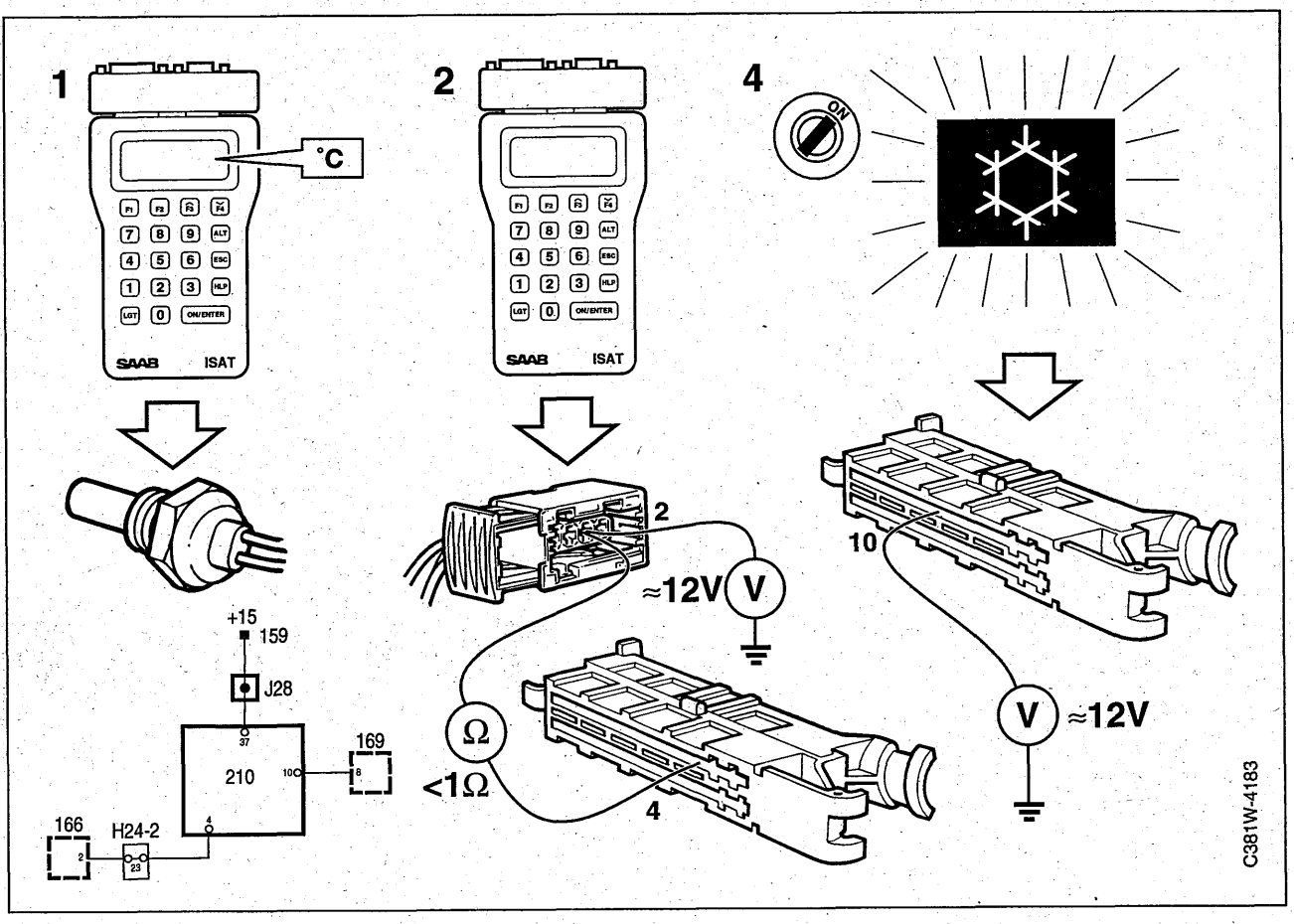
1 Unplug the temperature sensor connector. Check the resistance in the outside temperature sensor with the connector unplugged. The resistance varies with temperature, see table.
If the resistance is incorrect, change the sensor.

2 Check the lead between pin 35 on the control module and pin 1 on the outside temperature sensor for short to ground.

3 If the fault remains, proceed to page 92.

Resistance at 0°C(32°F)	kOhms	5,8 - 6,2
10°C(50°F)	kOhms	3,8 - 4,1
20°C(68°F)	kOhms	2,5 - 2,8
30°C(86°F)	kOhms	1,7 - 1,9
40°C(104°F)	kOhms	1,2 - 1,4

A/C



Fault symptom

A/C not working and the fault points to the circuit in the EDU.

Action

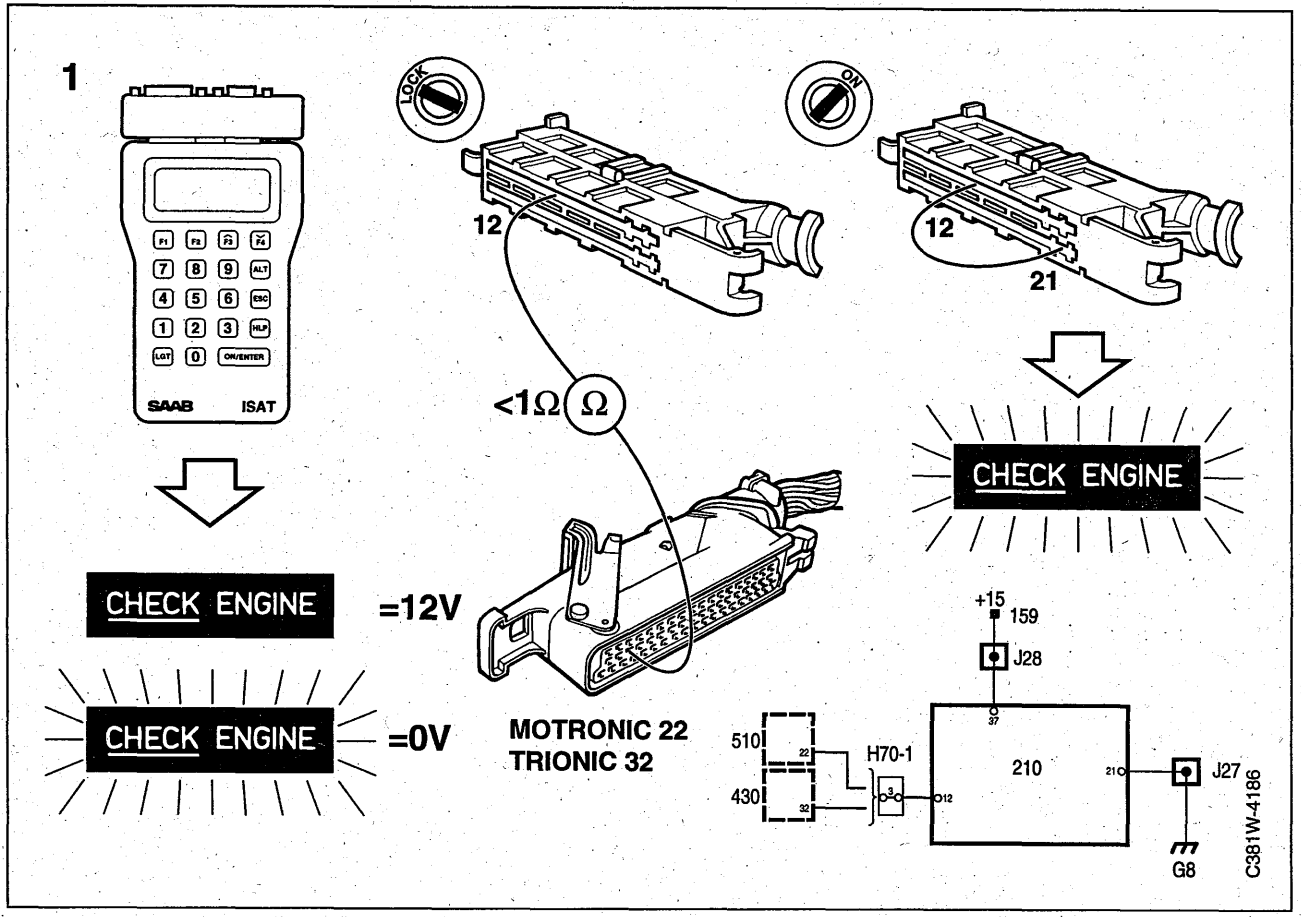
1 Connect the ISAT and read "COOLANT TEMPERATURE" under "READ VALUES". The temperature should be below 118°C(244°F) (4 cyl), 115°C(239°F) (6 cyl). If the engine temperature exceeds these values, the EDU automatically disconnects the A/C compressor.
If the temperature is under the specified values, go to point 2.

2 Go into the ISAT menu "AC" under "ACTIVATE". Activate the A/C and measure the voltage on pin 2 of pressure switch 166. This should be battery positive voltage.
If there is voltage, go to point 4.
If not, check the cable assembly between pin 2 on the pressure switch and pin 4 on the control module.

3 If the fault remains, proceed to page 92.

4 Check that there is voltage to pin 10 on the control module when the ACC / A/C switch is in the ON position.
If not, the fault is in the cable assembly to these components.

CHECK ENGINE



Fault symptom

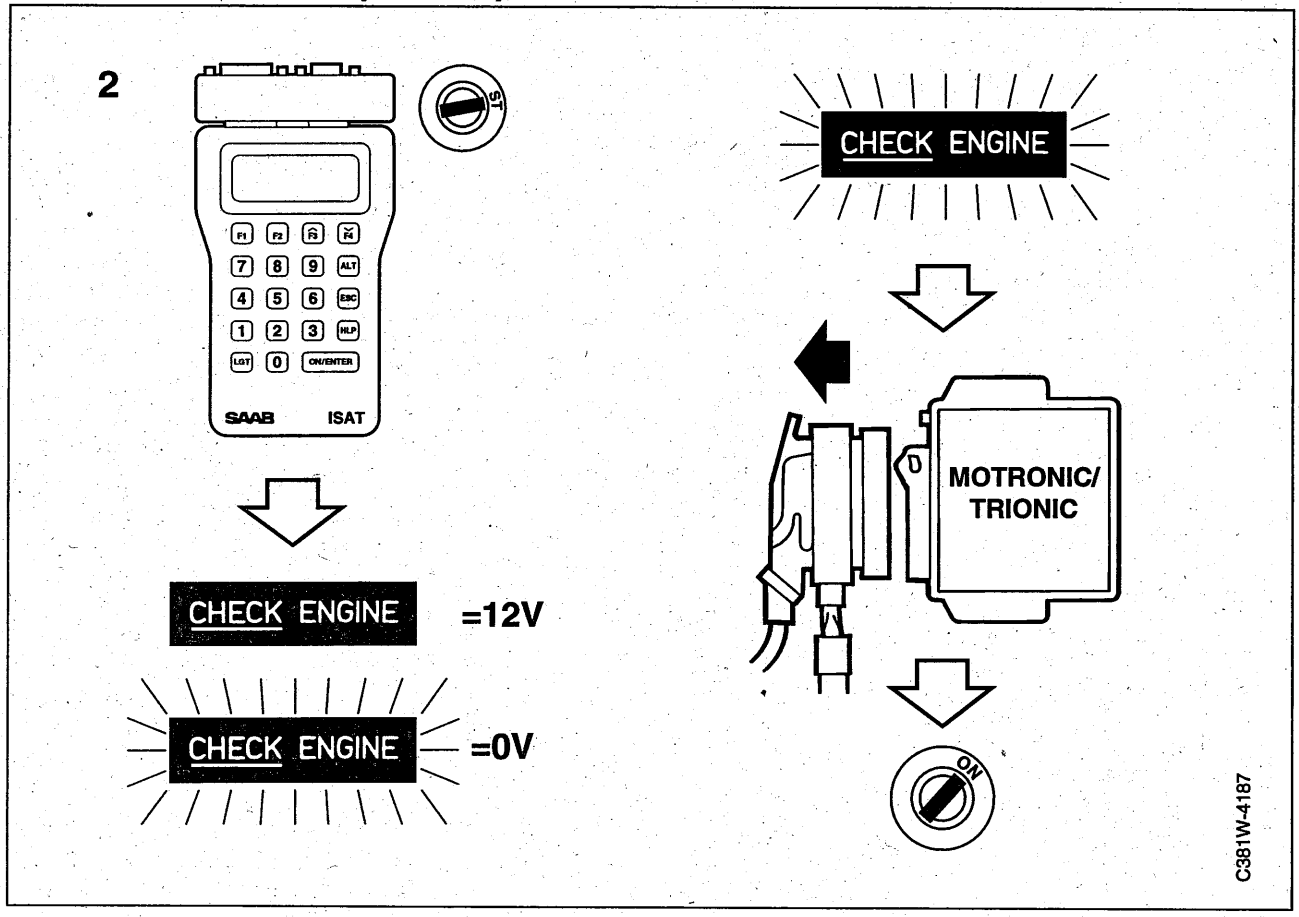
The malfunction indicator lamp does not light, see point 1.

The malfunction indicator lamp is lit continuously despite the fact that no diagnostic trouble code is registered in the engine management system, see point 2.

Action

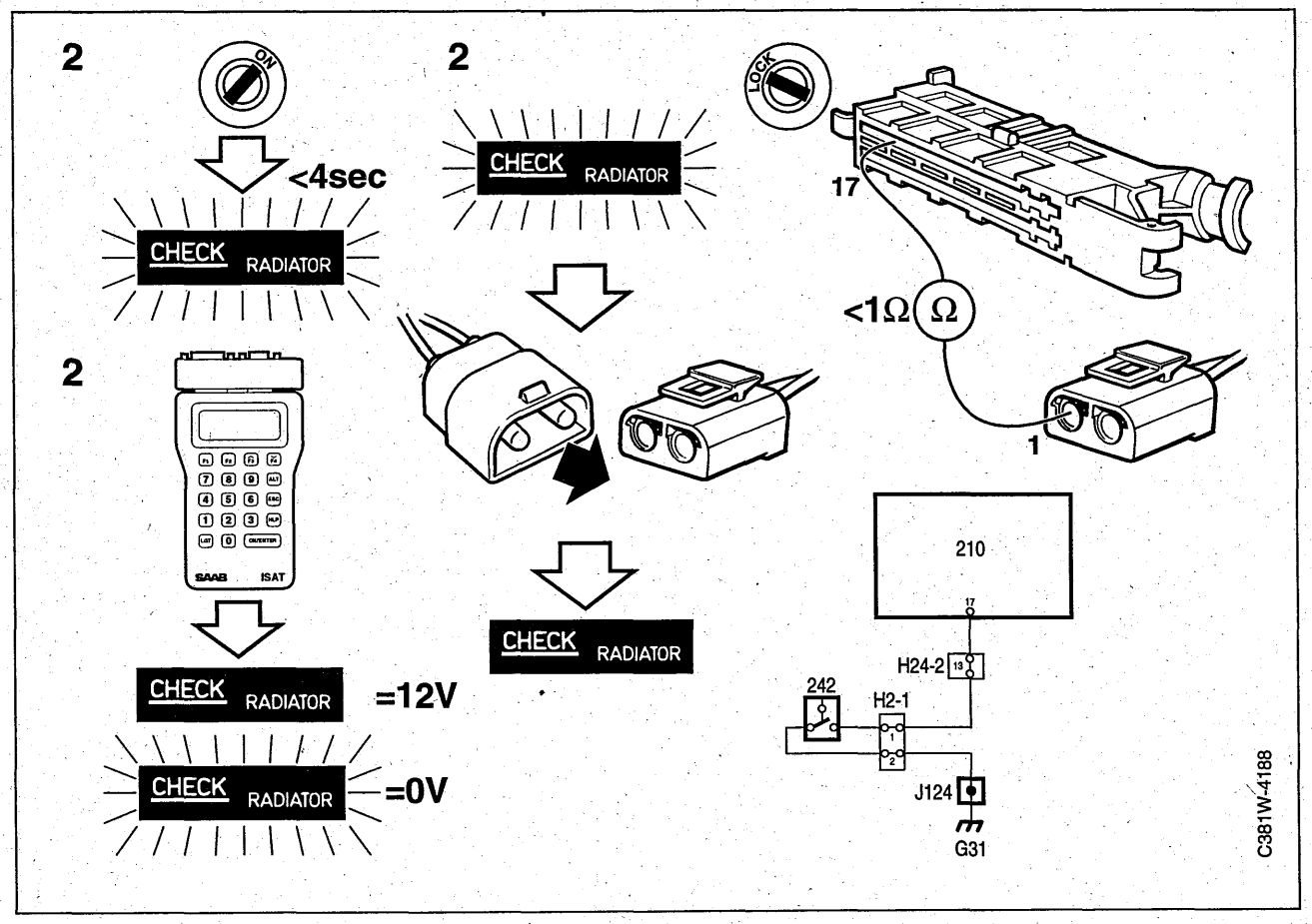
1 Connect the ISAT and read "CHECK ENGINE LAMP".
If the display response is ON 0 V, proceed to page 92.
If the display response is OFF 12 V:
If the car is fitted with Trionic engine management system:
Contact the Trionic (10) and activate CHECK ENGINE.
If CHECK ENGINE does not work at ON, check the lead from EDU control module pin 12 to Trionic control module pin 32 for open circuit. Localize and remedy the fault.
Connect a BOB to the EDU control module with the connector plugged in to the EDU control module. Ground pin 12 to pin 21.
If the lamp lights, change the Trionic control module.
If the lamp does not light, proceed to page 92.
If the car is fitted with Motronic engine management system:
Contact the Motronic and activate CHECK ENGINE.
If CHECK ENGINE does not work at ON, check the lead between EDU control module pin 12 and Motronic control module pin 22 for open circuit. Localize and remedy the fault.
Connect a BOB on the EDU control module with the connector plugged in to the EDU control module. Ground pin 12 to pin 21.
If the lamp lights, change the Motronic control module.
If the lamp does not light, proceed to page 92.

CHECK ENGINE (contd.)



2 Connect the ISAT and read "CHECK ENGINE LAMP". Start the engine.
If the display response is OFF 12 V, proceed to page 92.
If the display response is ON 0 V, switch off the engine and unplug the connector to the Trionic/ Motronic.
Switch on the ignition. If the lamp goes out, change the engine management system control module.
If the lamp does not go out, check the cable assembly between EDU control module pin 12 and Trionic control module pin 32/Motronic control module pin 22 for short circuit to ground.
If the fault remains, proceed to page 92.

CHECK RADIATOR



Fault symptom

Lamp does not light, see point 1.

The lamp does not go out at the correct coolant level, see point 2.

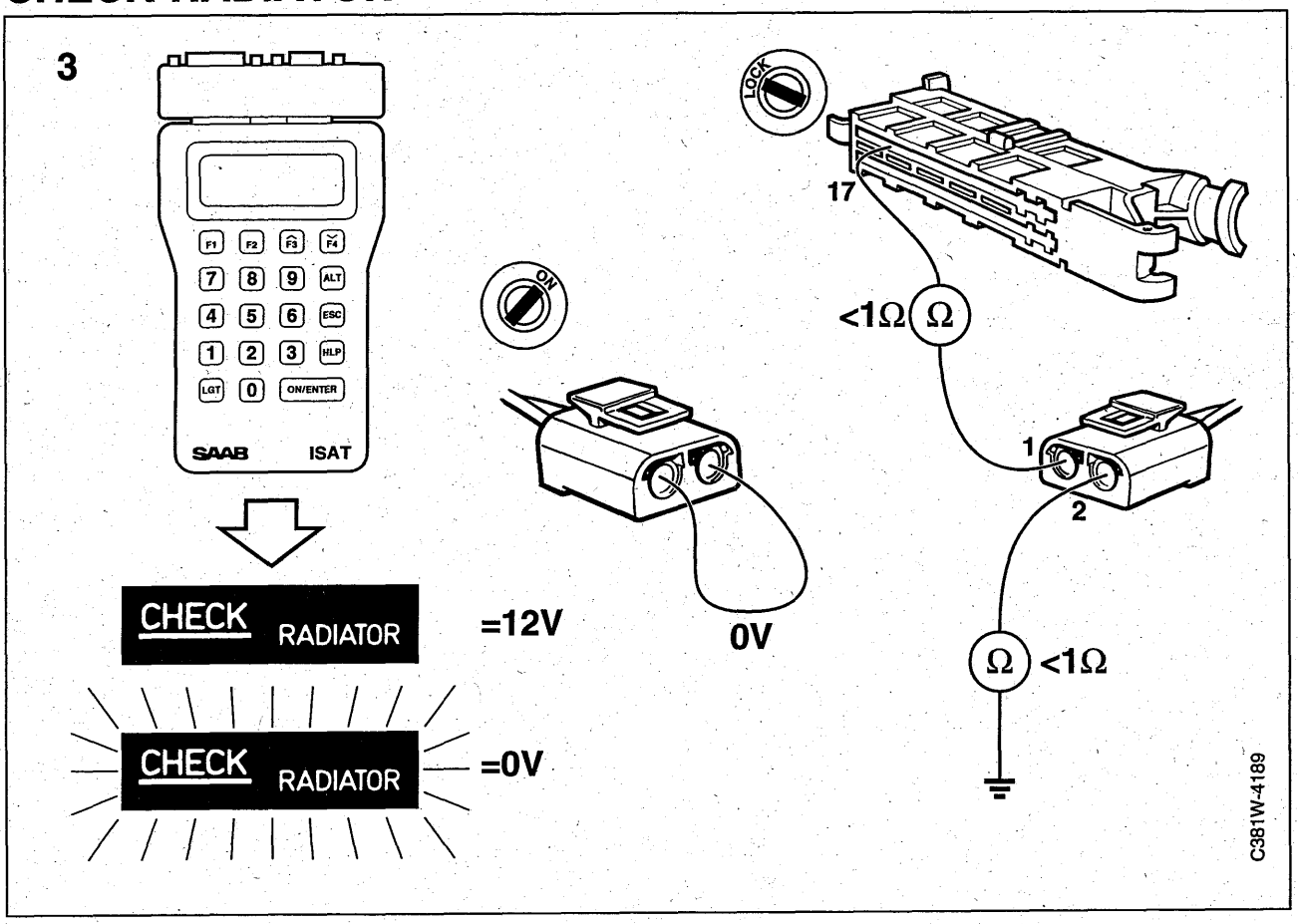
The lamp does not light when the coolant level is low, see point 3

Action

1 When the ignition is switched on, CHECK RADIATOR should light, stay lit for 4 seconds and then go out.
If CHECK RADIATOR lights but other EDU functions are not working, proceed to page 92.

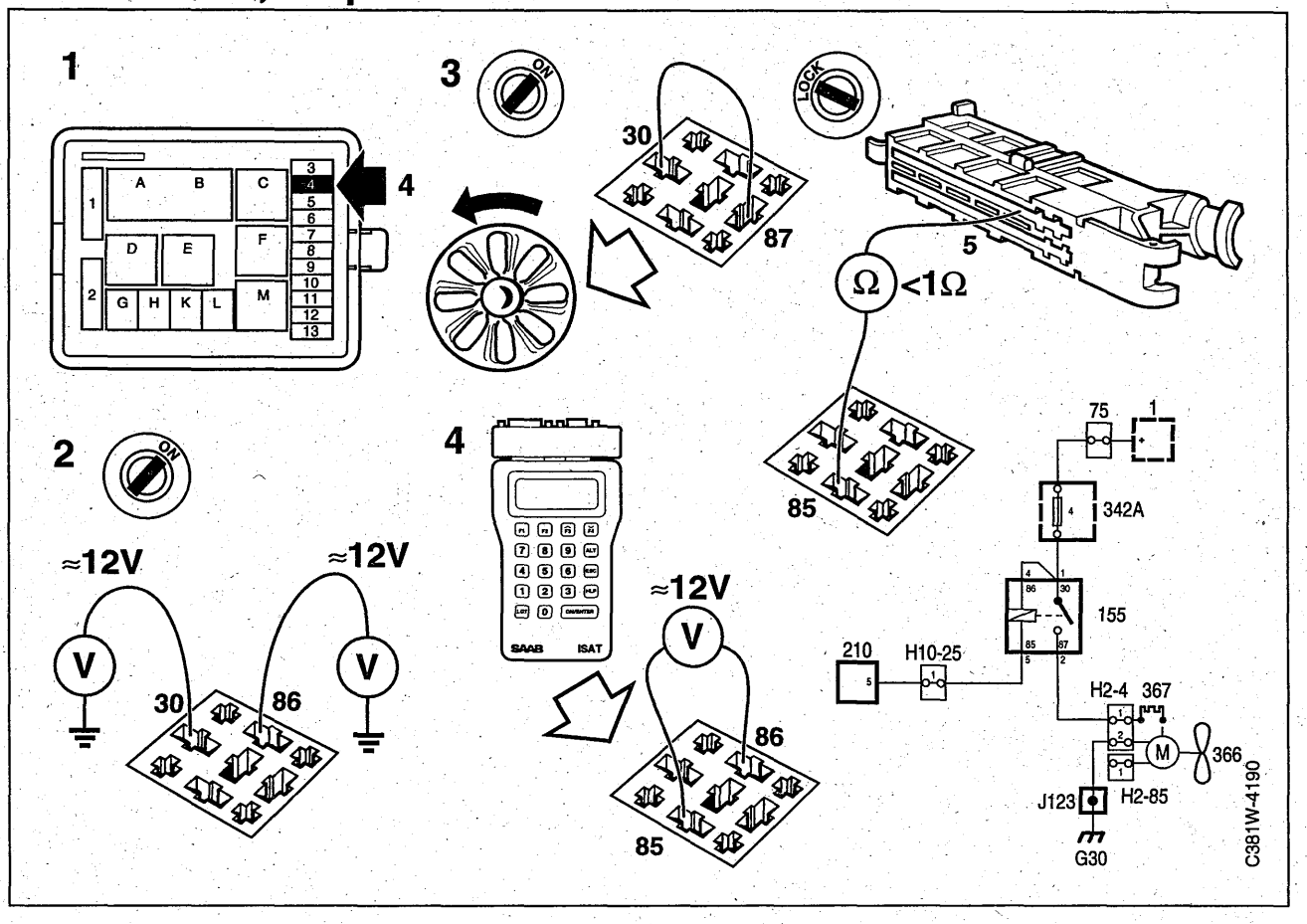
2 Connect the ISAT and read "COOLANT LEV. SENS".
If the display response is OFF 12 V, proceed to page 92.
If the display response is ON 0 V:
Part connector H2-1 to the sensor in the expansion tank. If the lamp goes out, change the sensor.
If the lamp does not go out, check the lead between pin 17 on the control module and pin 1 in connector H2-1 for short circuit to ground.

CHECK RADIATOR



3 Connect the ISAT and read "COOLANT LEV. SENS".
Display response OFF 12 V:
Part connector H2-1 and bridge between pins 1 and 2. If the lamp lights and the ISAT display response shows ON 0 V, change the sensor.
If the lamp does not light, check the cable assembly between pin 2 in connector H2-1 and pin 17 in the control module and between pin 2 and ground for open circuit.
If the fault remains, proceed to page 92.

Radiator fan, step 1



Fault symptom

Radiator fan not working (step 1 on cars with 2 step fans)

Action

1 Check that fuse 4 in the engine compartment electrical distribution box is intact.

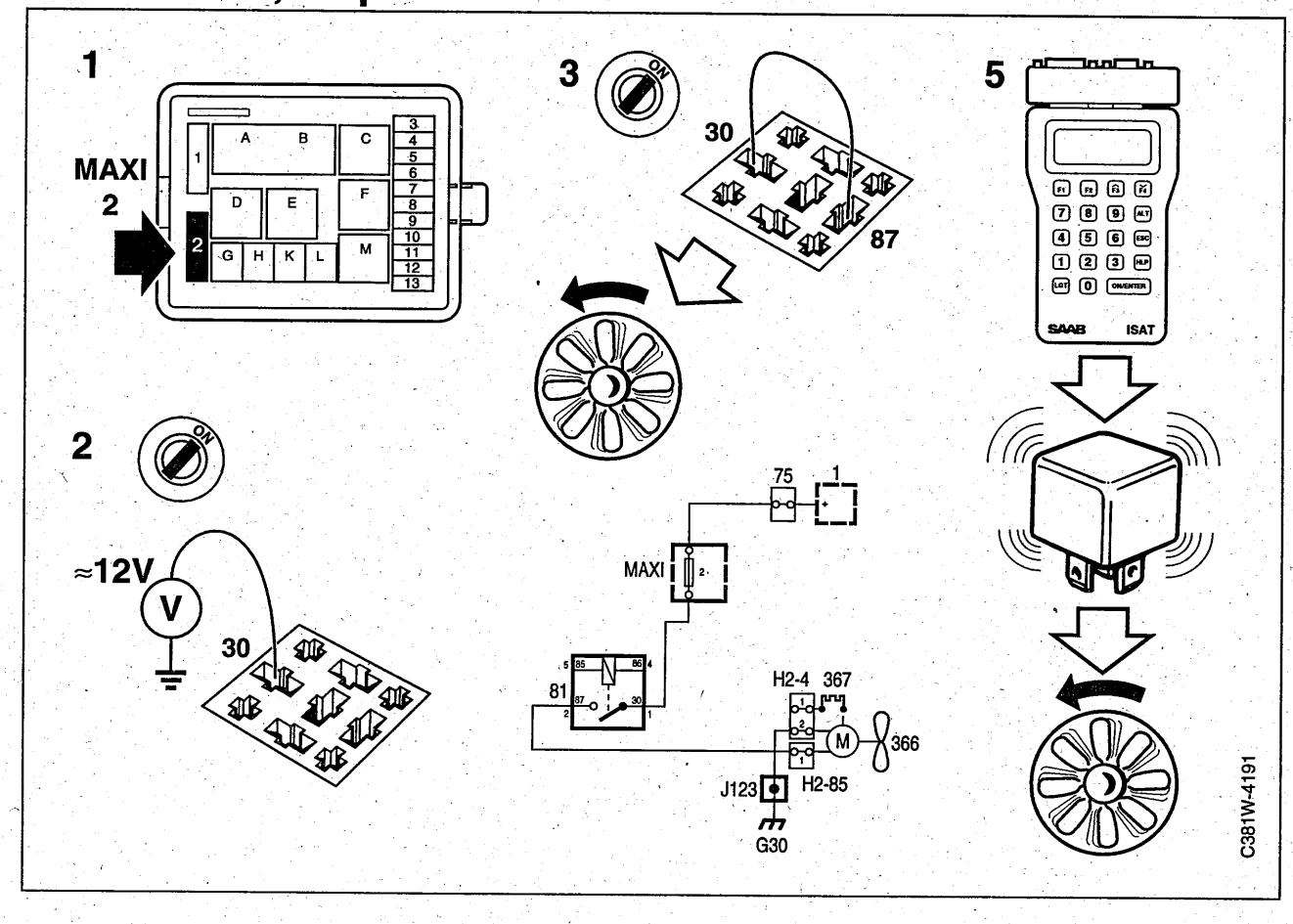
2 Remove relays and check the voltage supply to pins 1 and 4 (relays 30 and 86). This should be battery positive voltage.
Check the cable assembly and remedy any faults.

3 Bridge between pins 1 and 2 (relays 30 - 87). The radiator fan should now start.
If not, check the cable assembly, connectors, resistors to the radiator fan motor and grounding leads with connectors from the radiator fan motor.

4 Connect the ISAT and activate "RADIATOR FAN LOW".
Remove relays and measure the voltage between pin 4 (relay 86) and pin 5 (relay 85). Desired value is
ON - BATTERY POSITIVE VOLTAGE
OFF - 0 V
If the desired value is achieved, change the relays. If the desired value is not achieved, check the cable assembly between pin 5 on the control module and pin 5 (relay 85) for open circuit. Localize and remedy the fault.

5 If the fault remains, proceed to page 92.

Radiator fan, step 2



Fault symptom

Radiator fan step 2 not working.

Action

1 Check that maxi fuse 2 in the engine compartment electrical distribution box is intact.

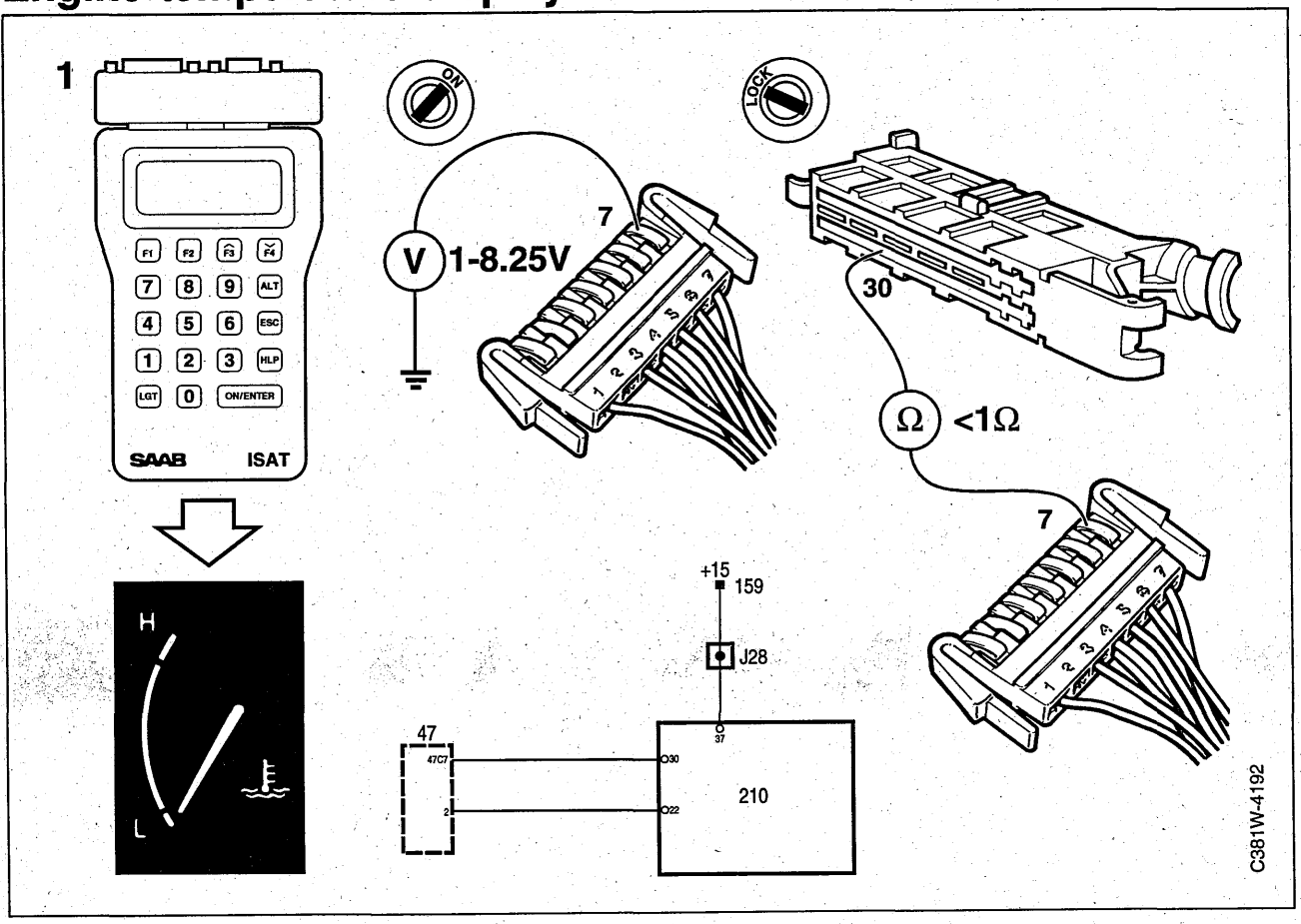
2 Remove relays and check the voltage supply to pin 1 (relay 30). This should be battery positive voltage.
If not, check the cable assembly for open/short circuit to ground.

3 Bridge between pin 1 and pin 2 in the relay bracket (relays 30-87). The radiator fan should now start. If not, check the cable assembly and connectors to the radiator fan motor and grounding leads with connectors from the radiator fan motor.

4 Fit the relays.

5 Connect the ISAT and activate "RADIATOR FAN HIGH".
ON = radiator fan activated
OFF = not activated
If the radiator fan does not work when activated, change relays.
If the fault remains, proceed to page 92.

Engine temperature display



Fault symptom

Engine temperature display not working.

Temperature gauge in min. position, see point 1.

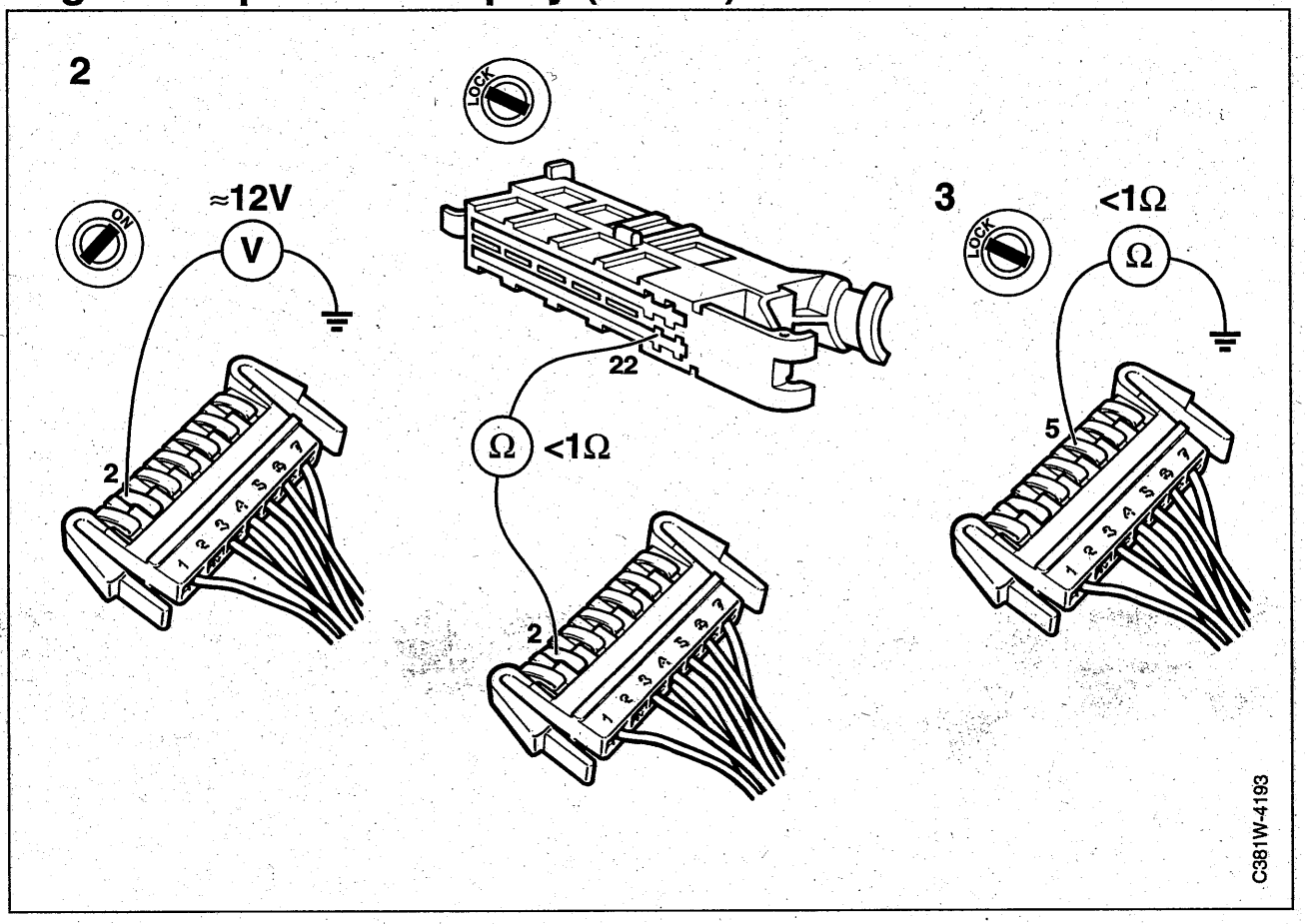
Temperature gauge/tank gauge i max. position, see point 2.

Temperature meter/fuel meter in min. position. Rheostat in min. position (light on) causes the right-hand direction indicator lamp to "glow". Rheostat in max. position causes the right-hand direction indicator lamp to light brightly. The temperature gauge moves about 5 mm when the rheostat is changed from min. to max., see point 3.

Action

1 Connect the ISAT and activate "ENGINE TEMP GAUGE" and check that the values programmed in °C in the ISAT correspond with the temperature gauge display.
Unplug the connector from the back of the temperature gauge. Measure the voltage on pin 7 of the temperature gauge. This should be between 1 and 9 V depending on the engine temperature.
If there is voltage, change the instrument.
If there is no voltage, check the cable assembly between pin 7 on the instrument and pin 30 on the EDU control module for open/short circuit.
If the fault remains, proceed to page 92.

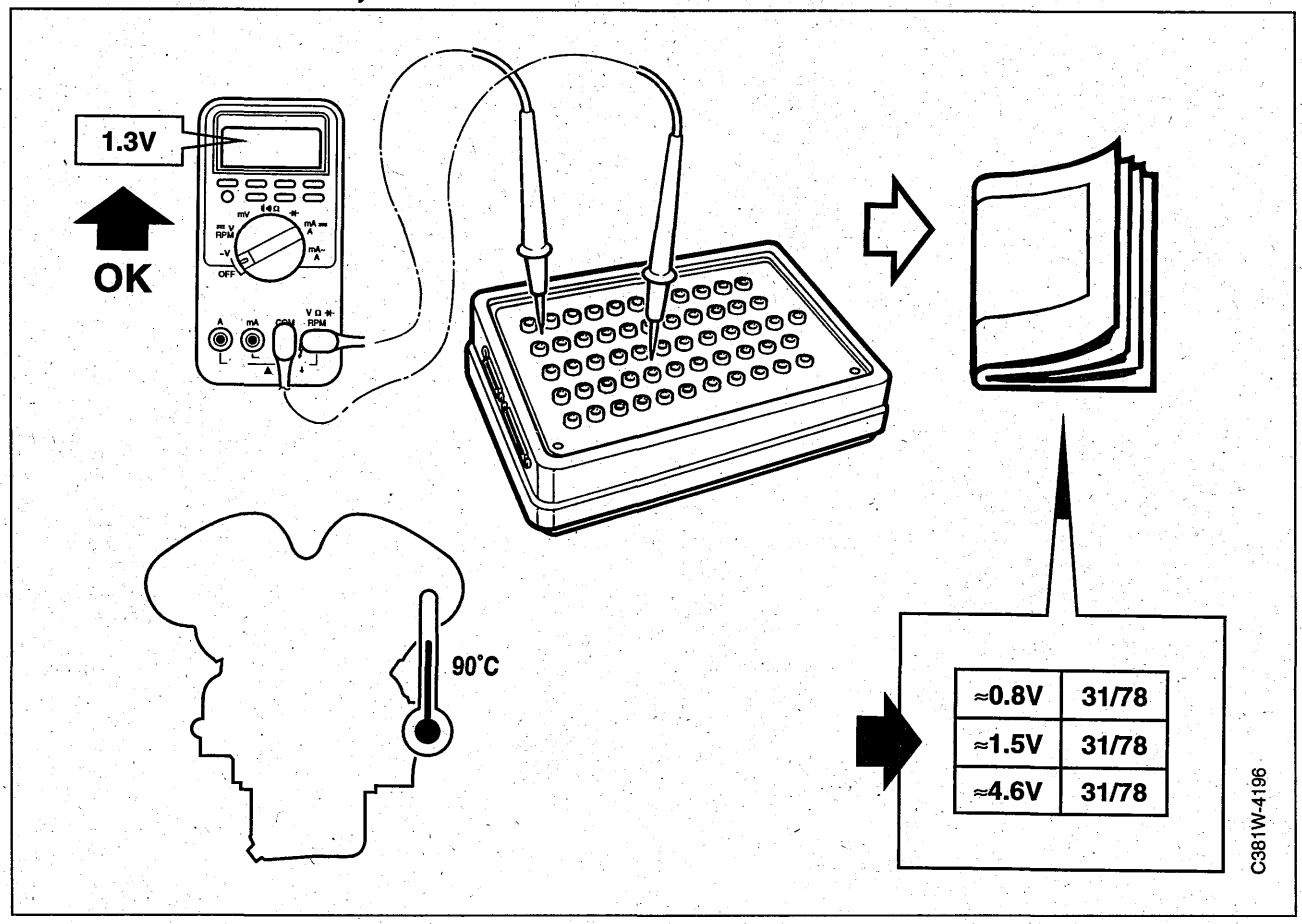
Engine temperature display (contd.)



2 Unplug the connector from the back of the temperature gauge. Measure the voltage between pin 2 and ground. Should be about 1 V under battery positive voltage.
If there is voltage, change the temperature gauge.
If there is no voltage, check the cable assembly between control module pin 22 and temperature gauge pin 2 for open/short circuit.
If the fault remains, proceed to page 92.

3 Check the lead between temperature gauge pin 5 and grounding point G8 for open circuit. Localize and remedy the fault.
If the fault remains, change the fuel gauge.

Measured values, control module connections



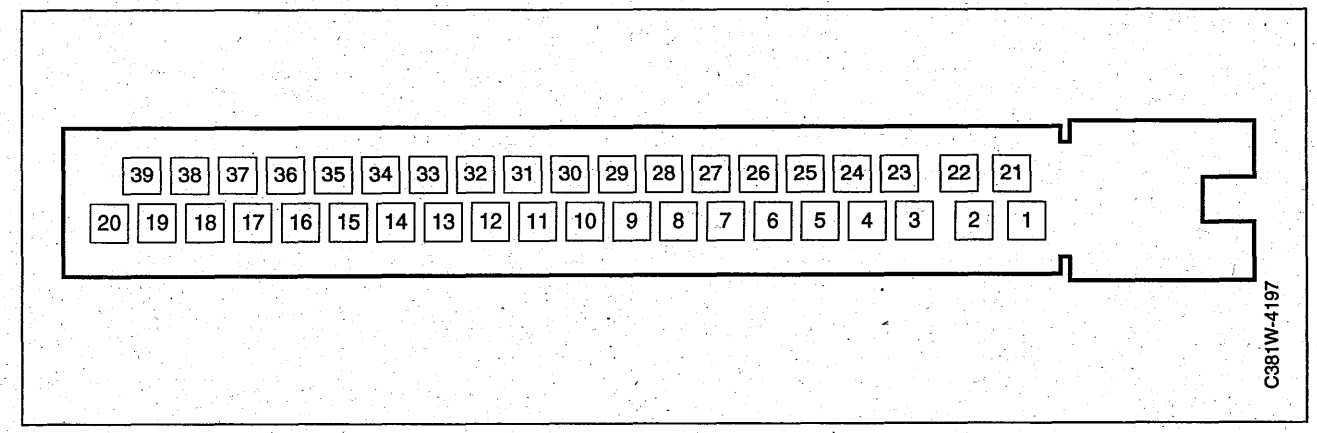
Scope

On the following pages are listed values and instructions for measuring signals/levels in the EDU control module.

Remember:

- The measurements should be made using a breakout box (BOB) connected between the control module and the control module connector
- A number of voltage levels must be regarded as guide levels. Use common sense when deciding if a measured value is correct or not.
- If any measured value is incorrect, use the wiring diagram to decide which leads, connectors or components should be tested further
- The page references in the table refer partly to the description of function for the particular signal and partly to the fault diagnosis schedule with full description of action.
- All data is for warm engine
- Unless otherwise stated, the ignition should be connected
- Data given is for calibrated FLUKE 88/97

Measured values, control module connections (contd.)



Pin	Component Function	In/Out	Measurement conditions	Measured value	Between	Function/ Fault diagnosis
1	Battery positive voltage +30	in		<0.5 V	BATT+ - 1	24
2	No connection					
3	ACC wake up	in	Command from ACC No command	BATT+ 0 V	3 - 21	40
4	A/C, out	out	ISAT activate A/C ON OFF	 BATT+ 0 V	4 - 21	39
5	Radiator fan, step 1	out	ISAT activate A/C ON OFF	 0 V BATT+	5 - 21	37/ 84
6	Radiator fan, step 2	out	ISAT activate A/C ON OFF	 0 V BATT+	6 - 21	37/ 85
7	No connection					
8	**Fuel pulses** Motronic TRIONIC	in	 Idle, warm engine Idle, warm engine	 6.25 Hz 3 ms 7.5 Hz 2.5 ms	8 - 21	29
9	Speed signal	in	Rotate front wheels 1 revolution/s 20 km/tim	Alternates between 0 and approx. 11 V approx. 12 Hz	9 - 21	28
10	A/C, in	in	AC/ACC ON OFF	 BATT+ 0 V	10 - 21	38/ 79
11	No connection					

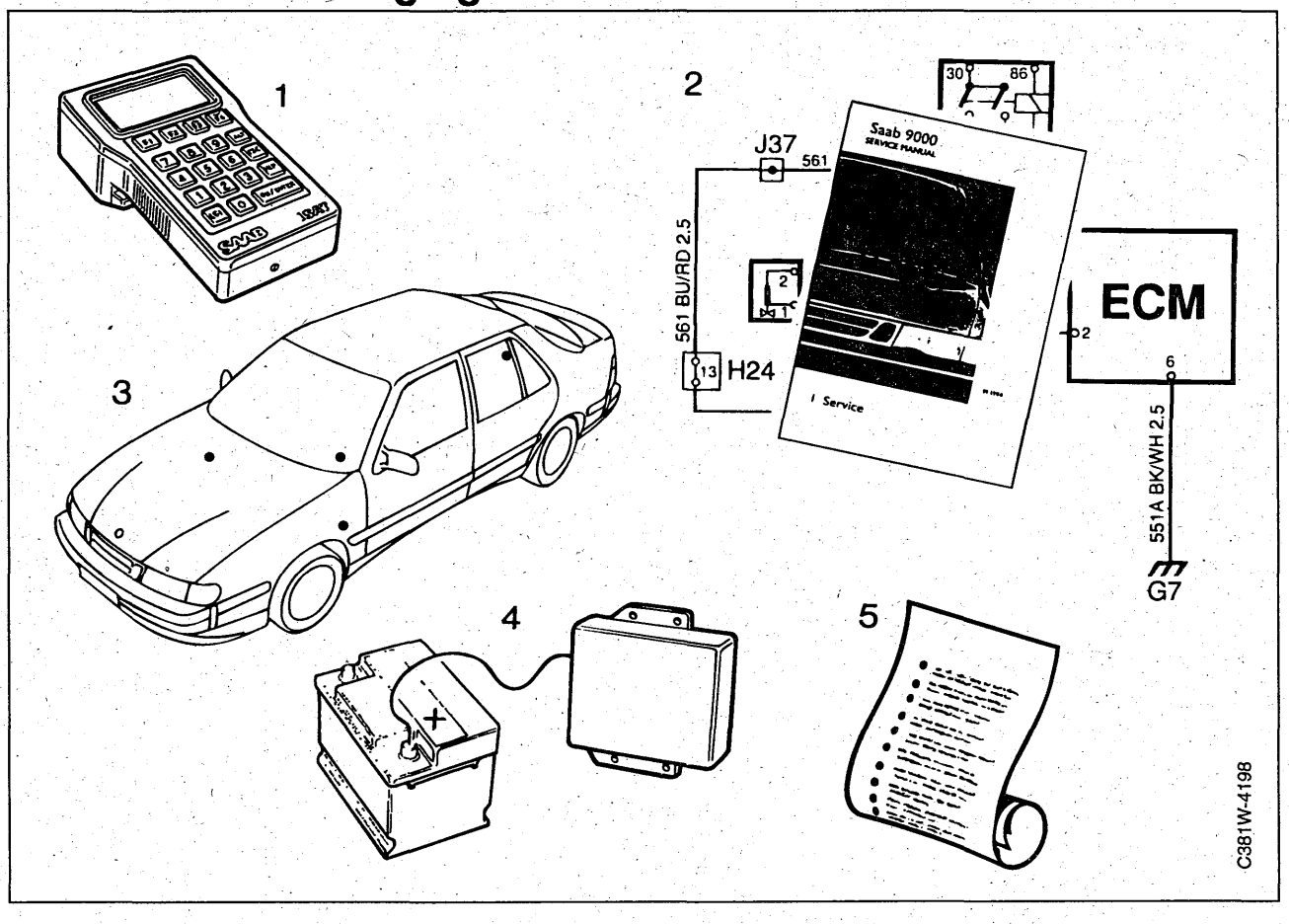
Measured values, control module connections (contd.)

Pin	Component Function	In/Out	Measurement conditions	Measured value	Between	Function/ Fault diagnosis
12	CHECK ENGINE	in	Lamp on lamp off	0 V BATT+	12 - 21	34/ 80
13	No connection					
14	INFO button	in	Button depressed button out	0 V BATT+	14 - 21	26/ 70
15	R button	in	Button depressed button out	0 V BATT+	15 - 21	26/ 70
16	No connection					
17	Coolant level	in	Lamp lit Lamp out	0 V BATT+	17 - 21	35
18	Trans. range switch A	in	P, R, 3, 2 N, D, 1	0 V 12 V	18 - 21	33/ 66
19	Trans. range switch B	in	R, N , D, 3 P, 2, 1	0 V 12 V	19 - 21	33/ 66
20	Trans. range switch C	in	D, 3, 2, 1 P, R, N	0 V 12 V	20 - 21	33/ 66
21	Ground	in		< 0.1 V	21 - BATT-	24
22	Voltage supply to fuel/temp. gauge	out		1 V under BATT+	22 - 21	42
23	Outside temperature signal	out		Fluctuates between 7 - 13 V	23 - 21	41
24	Fuel level gauge	out	Empty tank Full tank	approx. 1 V approx. 9 V	24 - 21	42
25	Lamp, low fuel level	out	Activate with ISAT Lamp ON Lamp OFF	 0 V BATT+	25 - 21	31
26	Ground, fuel level sensor	in		< 0.1 V	26 - 21	30
27	Ground, coolant temperature sensor	in		< 0.1	27 - 21	36
28	Ground, outside temperature sensor	in		< 0.1	28 - 21	32
29	No connection					
30	Engine temperature display	out		1 - 9 V depending on coolant temp.	30 - 21	42
31	No connection					
32	Rheostat	in	 Rheostat min. Rheostat max.	13 - 100% PWM approx. 2 V Batt+	32 - 21	27
33	Fuel level sensor	in	Empty tank Full tank	approx 0.4 V approx. 3 V	33 - 21	30

Measured values, control module connections (contd.)

Pin	Component Function	In/Out	Measurement conditions	Measured value	Between	Function/ Fault diagnosis
34	Coolant temperature	in		0 - 1 V, depending on temp.	34 - 21	36
35	Outside temperature sensor	in		1.5 - 5 V depending on temp.	35 - 21	32
36	Light sensor	in	Min. light intensity Max. light intensity	0 V 10 V	36 - 21	27
37	+15	in		< 0.5 V	37 - BATT+	24
38	Scan tool diagnostics	in/out	ISAT connected ISAT not connected	Batt + 5 V	38 - 21	25

Action before changing a control module



When all checks have been carried out as described in the program of action under the appropriate diagnostic trouble code or by manual fault diagnosis, and no fault has been found, it is natural to assume that the control module is faulty.

Considering that the control module is both a high quality and an expensive component, it is important to be as sure as possible of the diagnosis.

For this reason, run carefully through the following points before definitely deciding that the EDU control module is the cause of the fault.

1 Check one more time that all the checks in the appropriate fault diagnosis schedule have been followed.

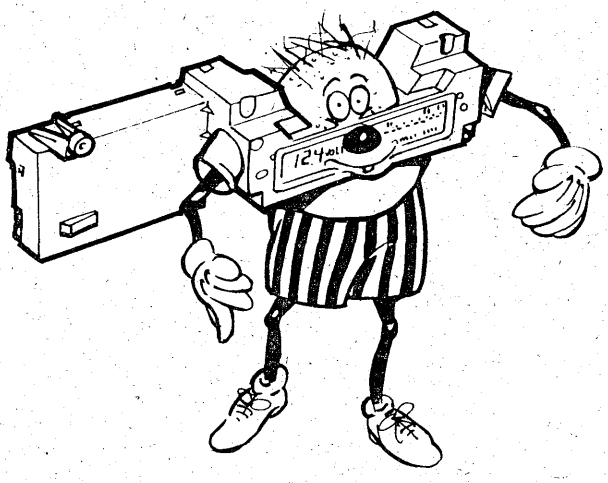
2 Study the wiring diagram for the appropriate circuit and make sure that you understand it. If necessary, consult the appropriate parts of the technical description and the electrical description of function in Service Manual "3:2 Wiring diagrams".

3 Check all grounding points.

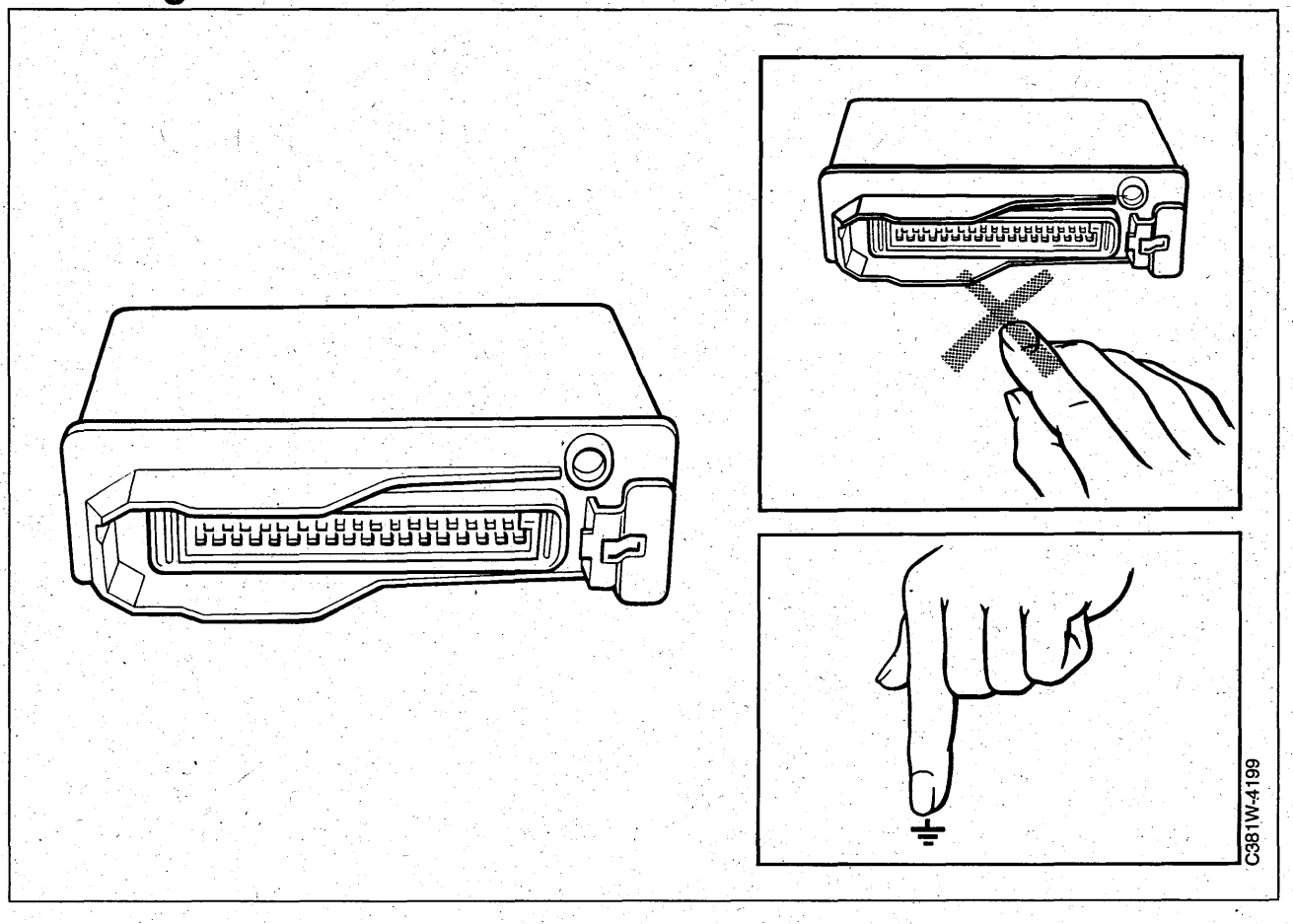
4 Check the voltage supply to the control module.

5 Run through the points under "Fault diagnosis, general" on page 43.

6 If the original fault still remains, the EDU control module must be changed.



Handling control modules

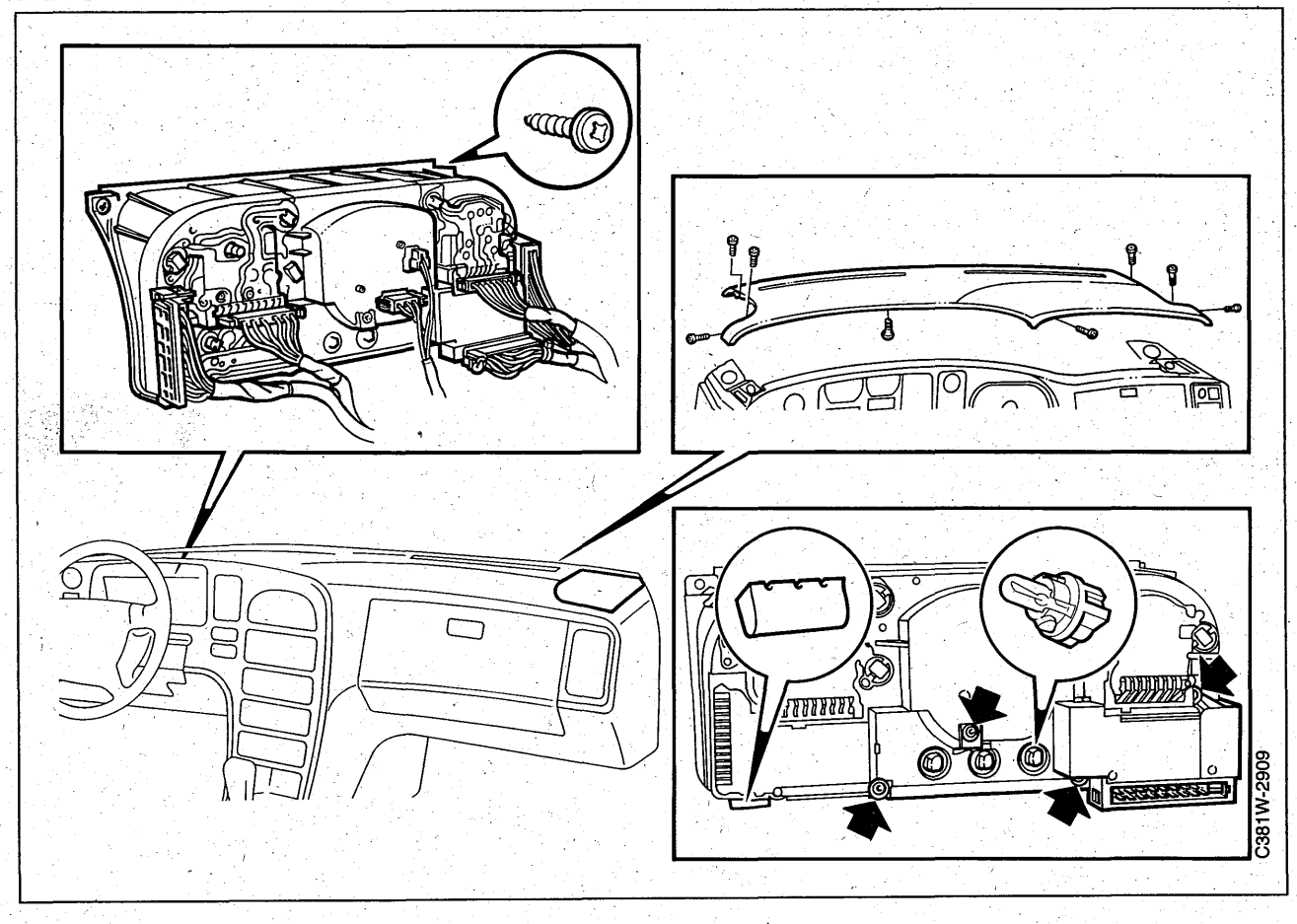


All control modules are more or less sensitive to static electricity and can, if they are handled incorrectly, be so seriously damaged as to render them unserviceable. For this reason, it is important to adhere to the following rules whenever removing or changing a control module for any reason.

- Avoid unplugging or removing the control module unless it is absolutely necessary
- Never touch the connector pins and never place the control module where the connector pins may come into contact with anything else.
- Before unpacking a new control module, ground the packaging to the car bodywork and open it as short a time as possible before fitting
- When working with the control module, it is important to regularly ground yourself. The is especially important when you have been sitting in the car, when you have changed position or moved around the car and is even more important when working in climatic conditions with very dry air (for example during the winter in cold markets)
- Avoid wearing clothes of synthetic materials
- Avoid wearing shoes with insulating rubber soles
- In addition, always handle control modules suspected of being faulty in the same way. This significantly increases the possibility of localizing the cause of the fault

Changing components

EDU



To remove

1 Remove the trim from both A pillars, both speaker grilles and the facia cover.
2 Remove the two screws holding the instrument.
3 Lift up the instrument a little bit and remove the 7 connectors on the back of the instrument.
4 Lift the instrument out of the facia.

Important

Be careful that the rubber supports on each side of the instrument do not become detached.

5 Remove the 3 screws securing the EDU control module to the back of the instrument.

To change lamps

6 Turn the lamp holder on the back of the EDU control module one quarter turn and lift out the lamp and socket.

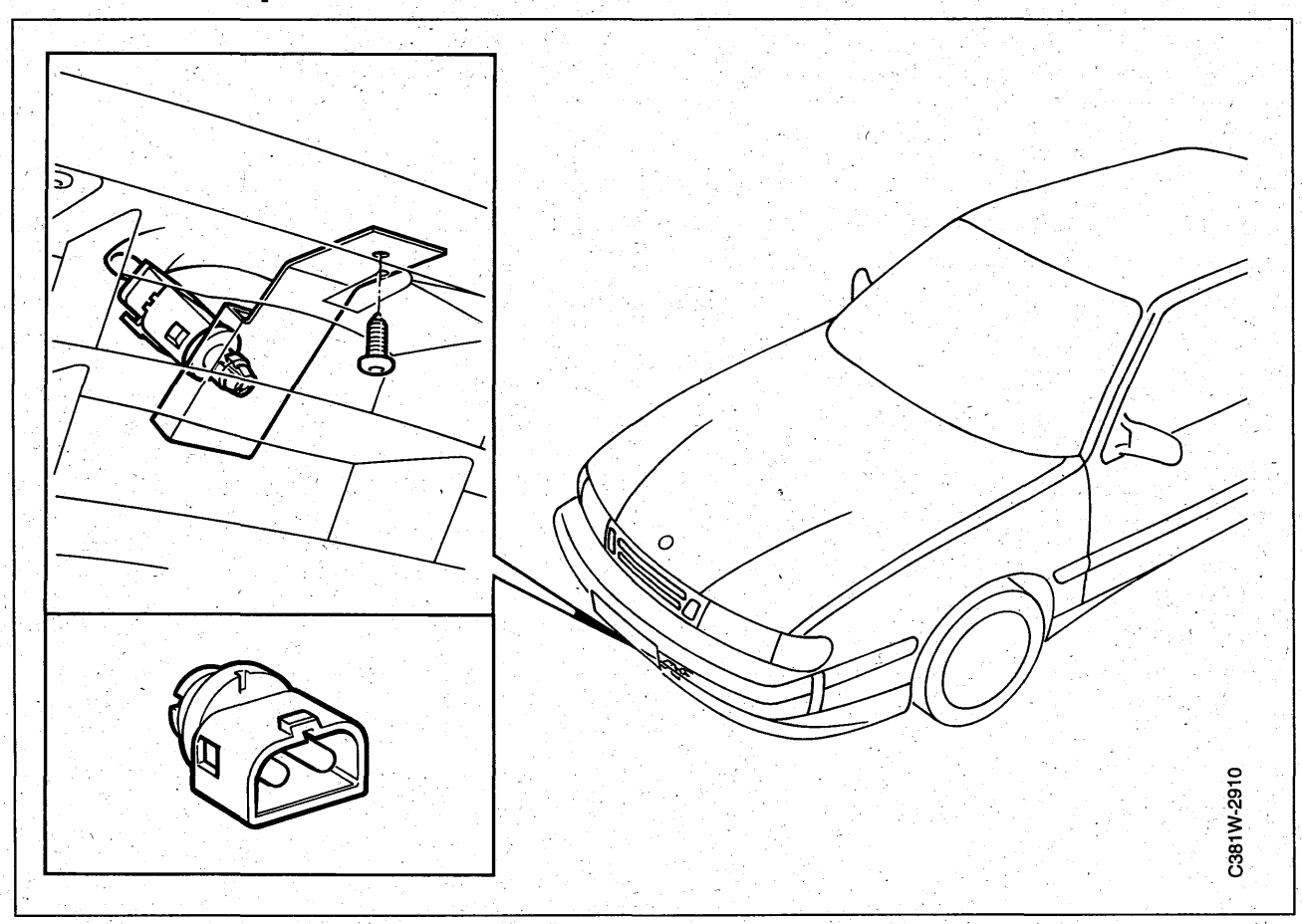
Lamps

1.8 W with T4.7 Neo Wedge socket fixed to the lamp.

To fit

Fitting is in reverse order.

Outside temperature sensor



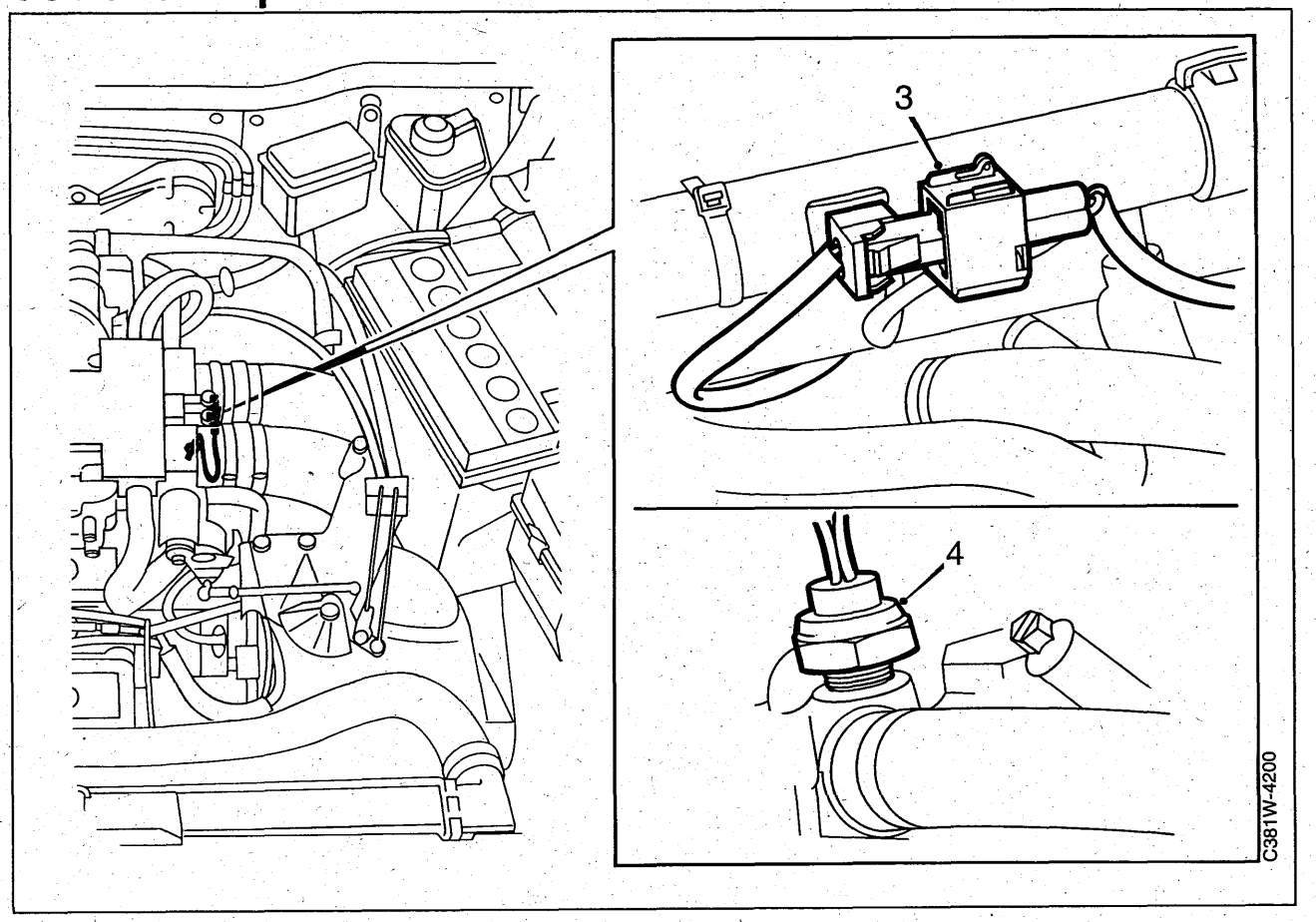
To remove

1 Remove the screw securing the outside temperature sensor bracket.
2 Push the bracket back to get it out of the plastic holder.
3 Carefully pull out the bracket with the outside temperature sensor through the ribs.
4 Detach the sensor from the bracket.

To fit

Fitting is in reverse order.

Coolant temperature sensor



To remove

1 **V6:** Remove the intake manifold and resonance box, see Service Manual 2:7 "Motronic 2.8.1".
2 Release the pressure in the coolant system by undoing the cap on the expansion tank. Refit the cap.
3 Unplug the connector.
4 Remove the sensor.

To fit

Fitting is in reverse order.

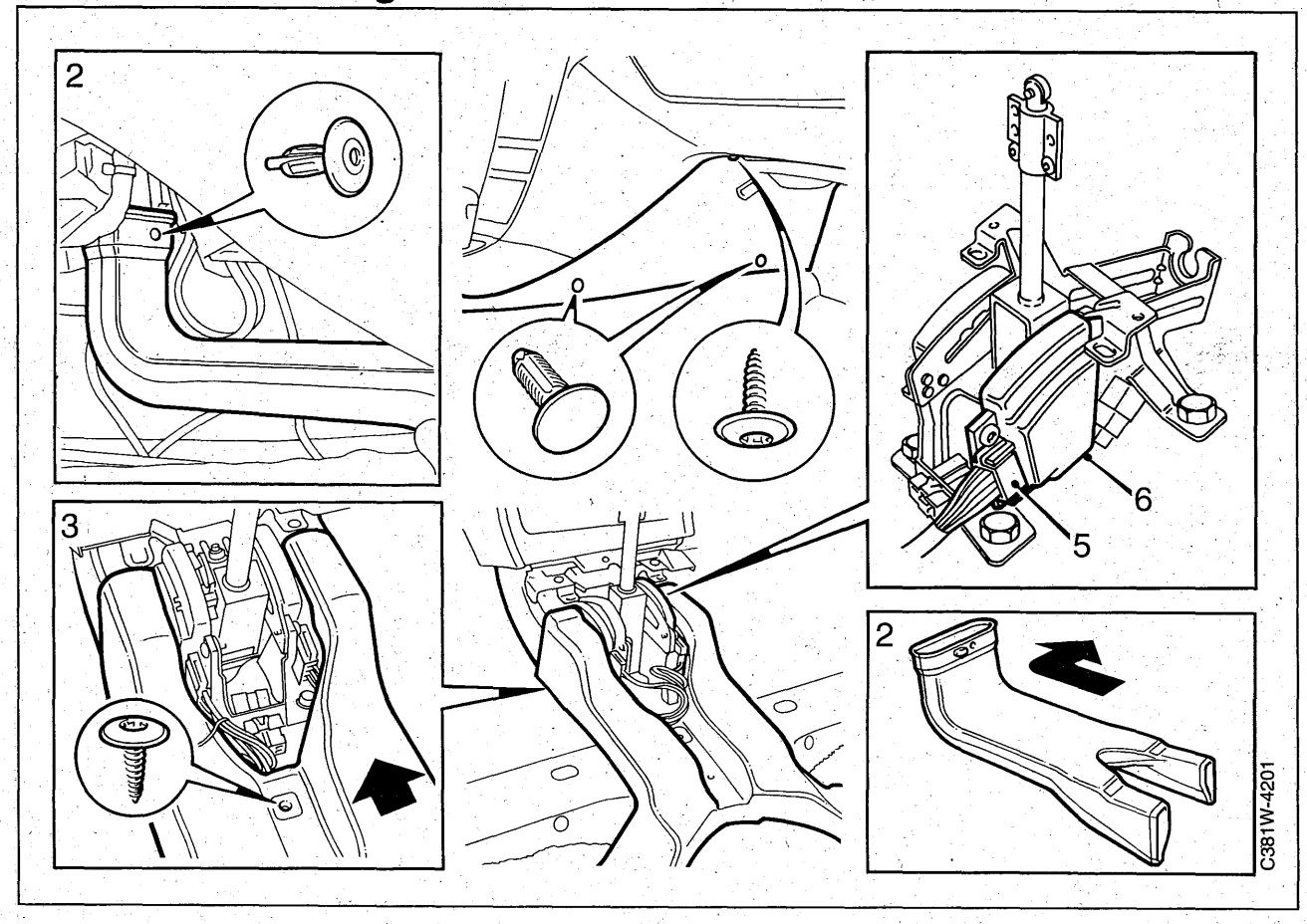
Tightening torque: 13 Nm (9.6 lbf ft).

Top up the coolant if necessary.

Note:

V6: Check and if necessary adjust the throttle cable and the kick-down cable, if fitted. See Service Manual 2:7 "Motronic 2.8.1".

Transmission range switch



To remove

1 Remove the center console, see Service Manual 8:2 "Interior equipment".
2 Disconnect the front air duct under the center console by removing the plastic clips. Press the air duct forward (in the car) and remove.
3 Remove the rear floor duct screw and push the duct back to gain better access.
4 Push the seat to its furthest back position.
5 Unplug the connector.
6 Remove the transmission range switch.

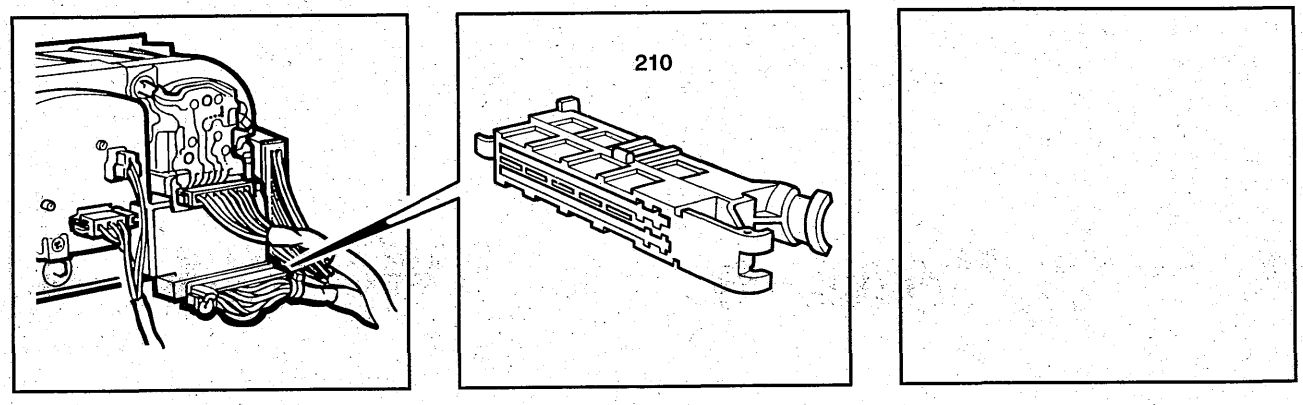
To fit

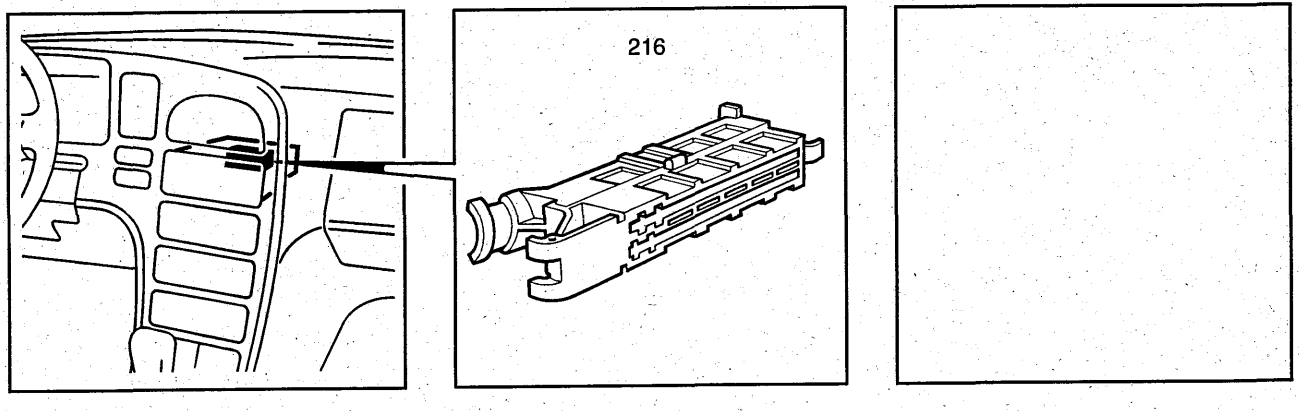
Important

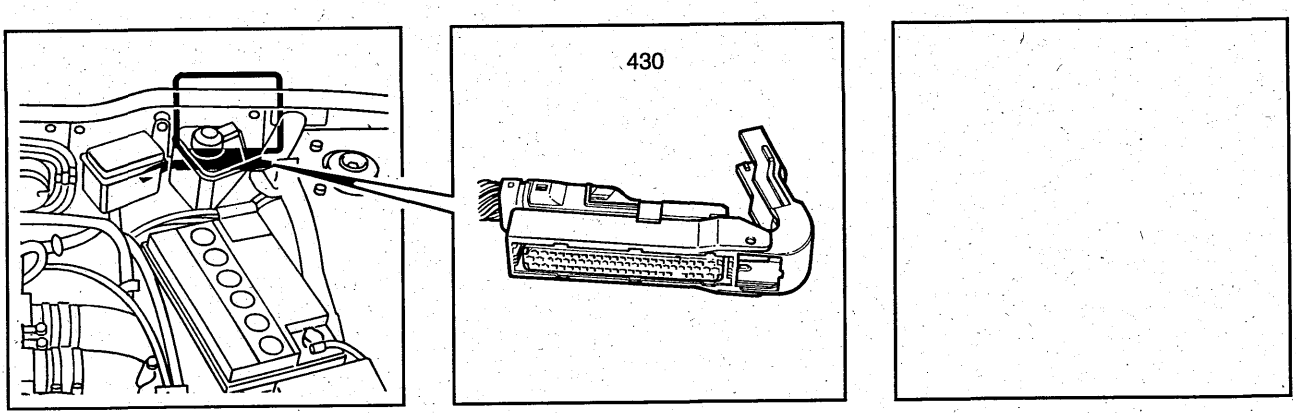
Conduct a function test on the transmission range switch before fitting.

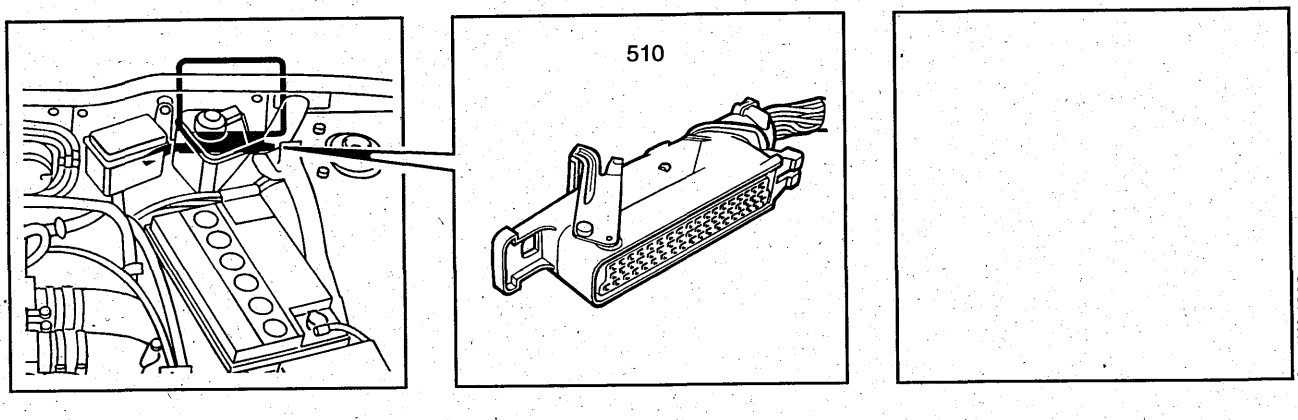
Fitting is in reverse order.

Connectors and grounding points









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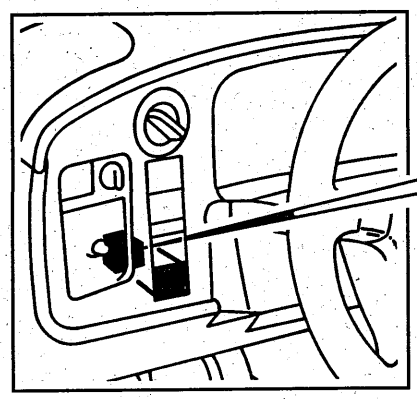

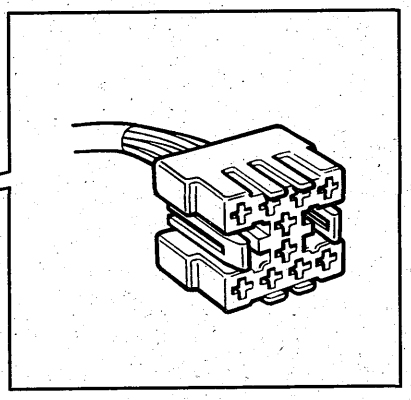

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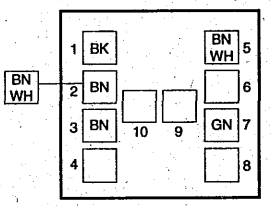

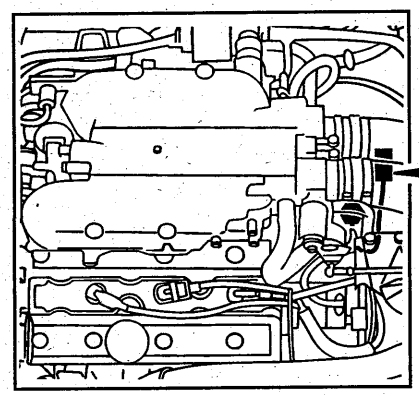

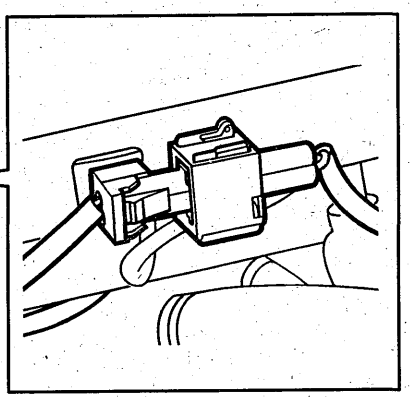

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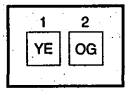

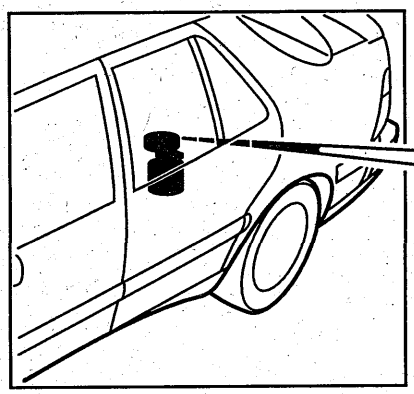

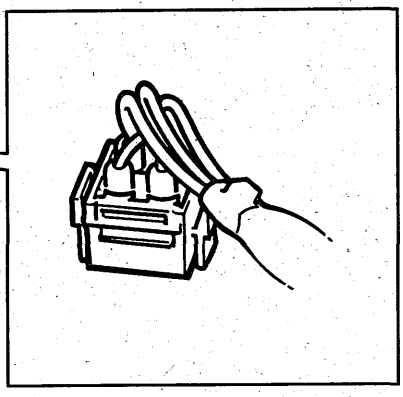

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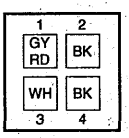
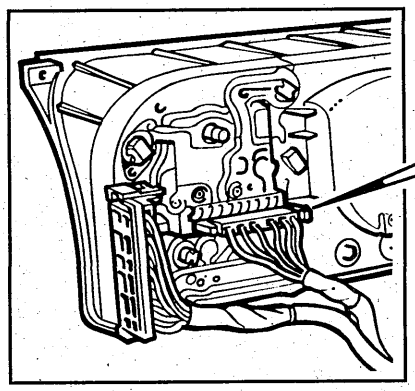
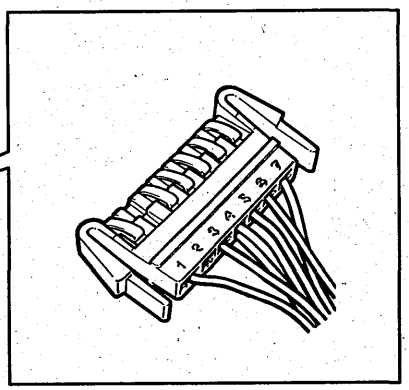
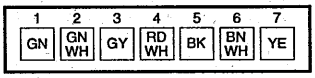


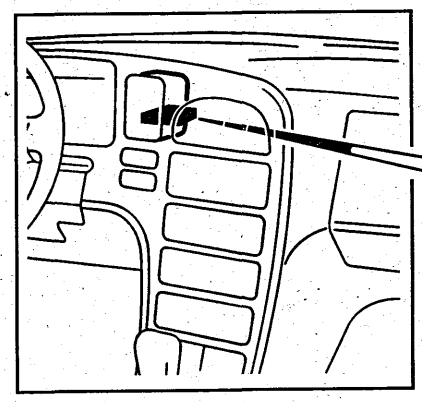


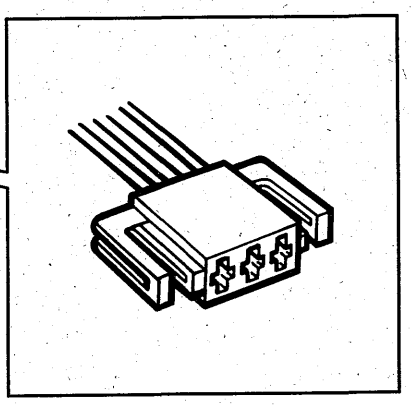


47 (A,C,B)



C381W-4204





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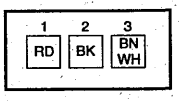

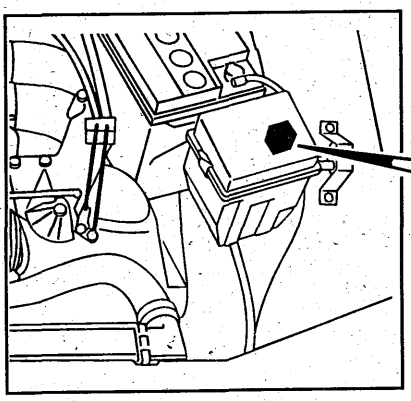

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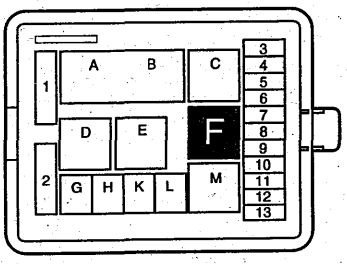

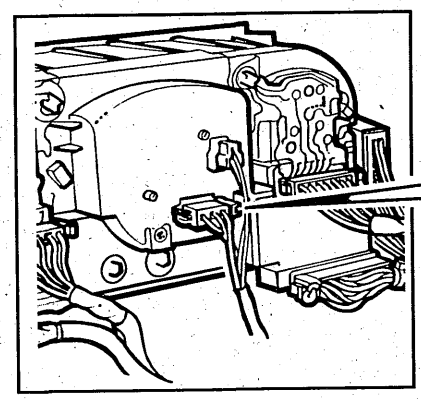

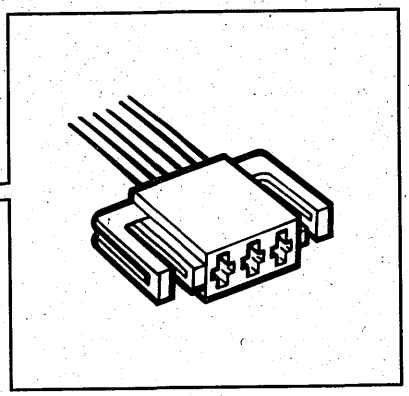

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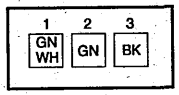

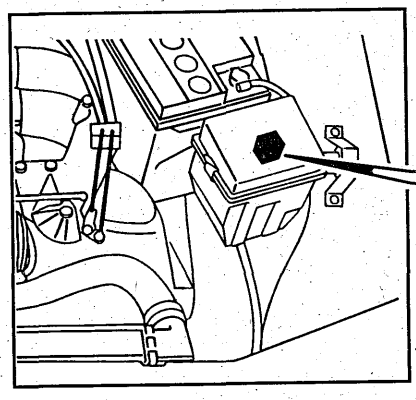

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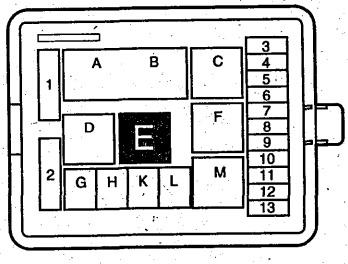
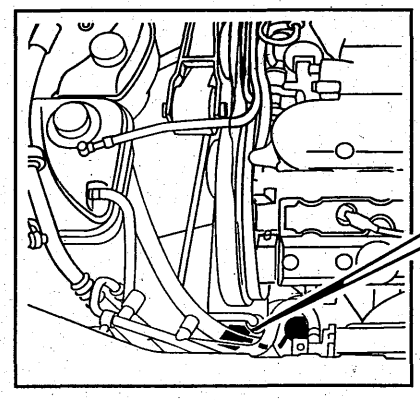
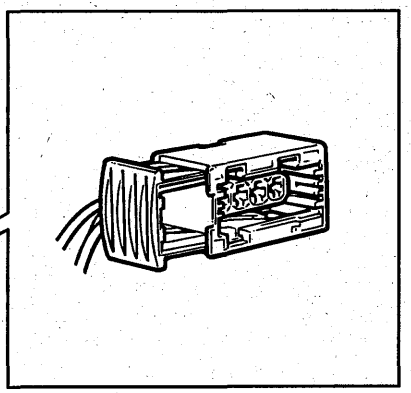


C381W-4205





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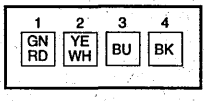

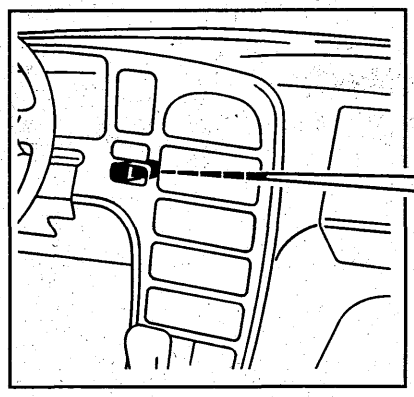

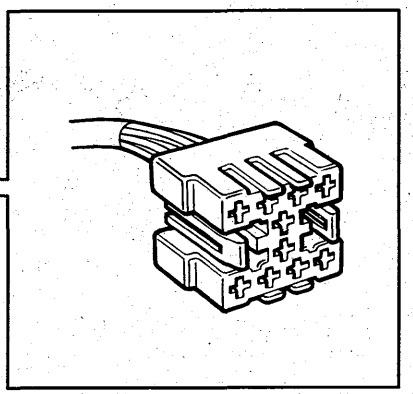

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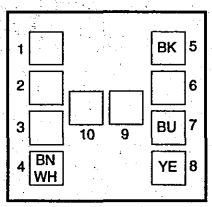

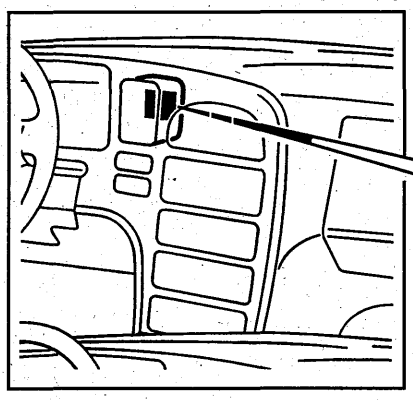

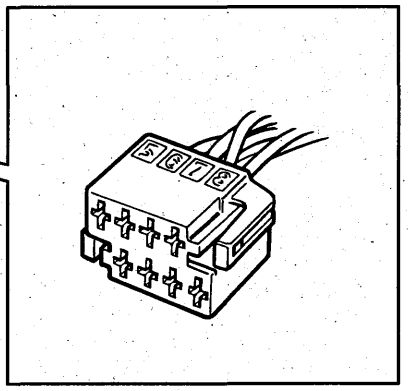

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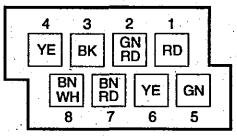

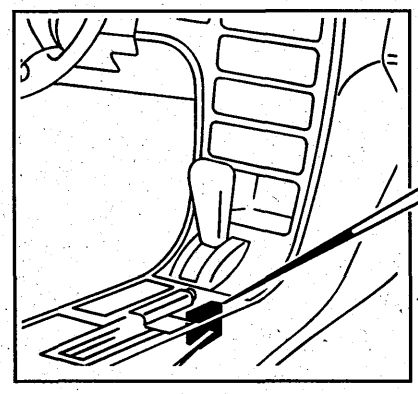

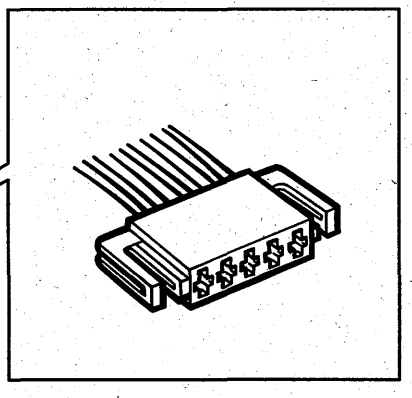

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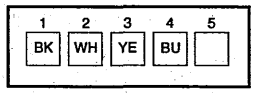
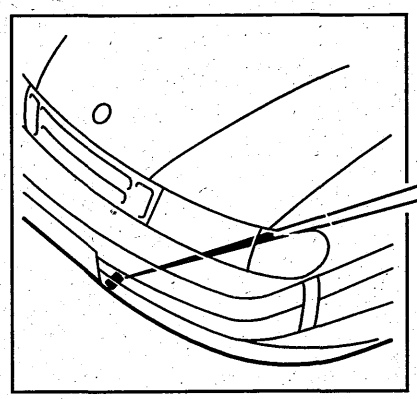
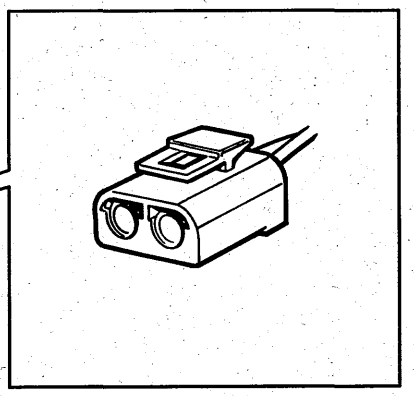


C381W-4206





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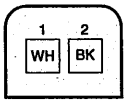

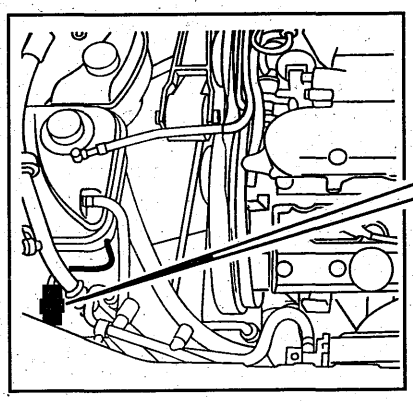

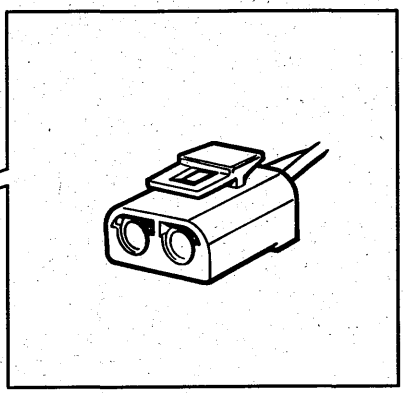

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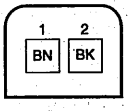
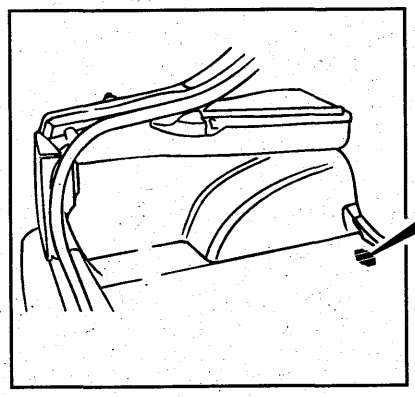
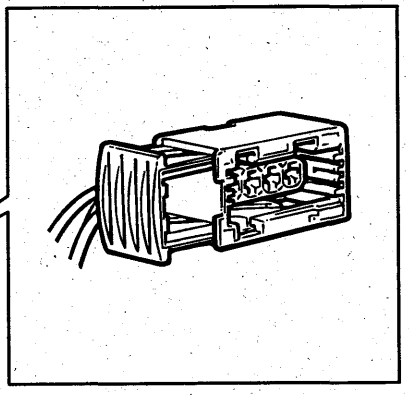
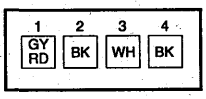
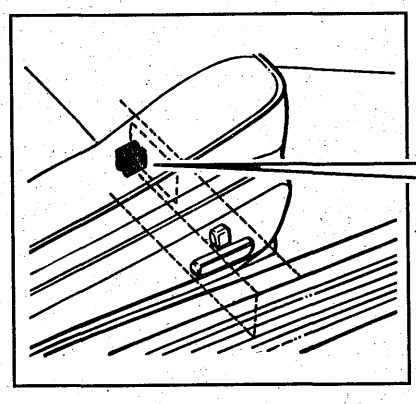


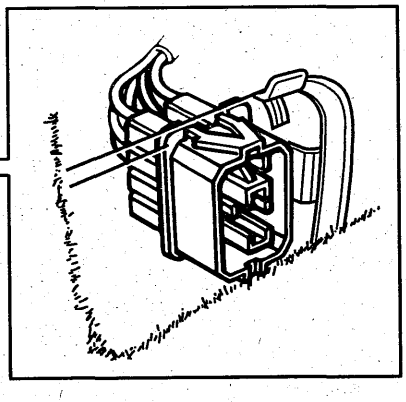




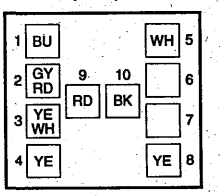
H4-4



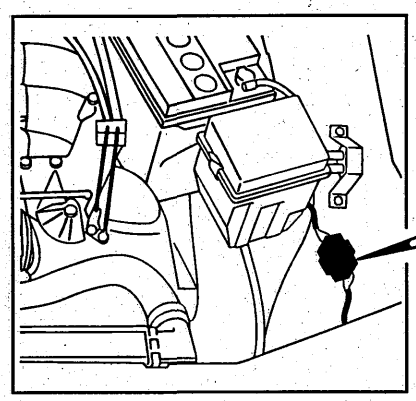


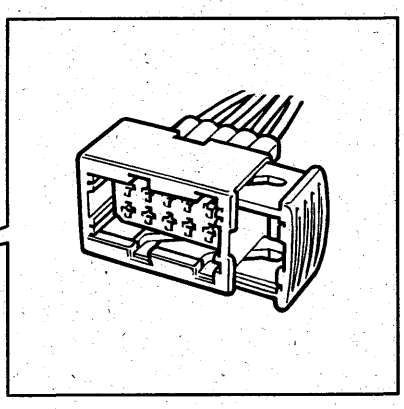


H10-9
(348)



C381W-4207





H10-15

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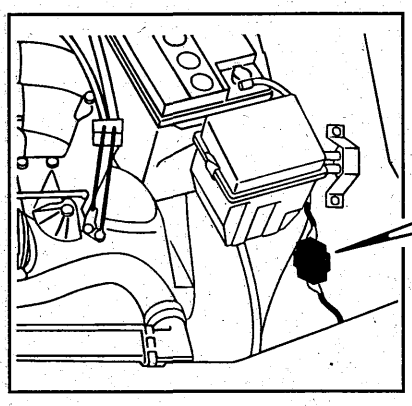
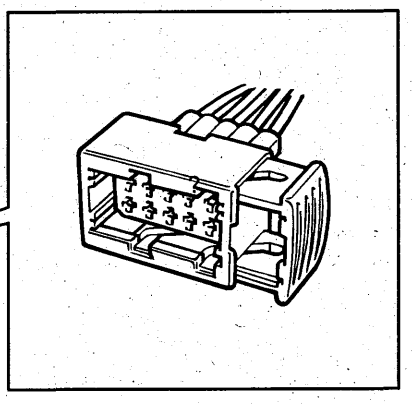
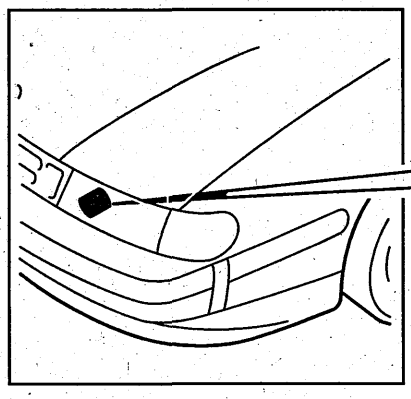
GN RD	RD	WH	YE	RD
6	7	8	9	10
	GN	BU WH	GN RD	BU WH

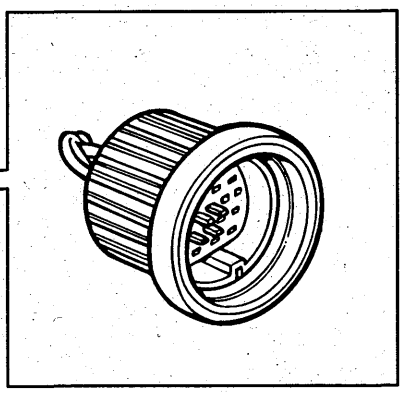




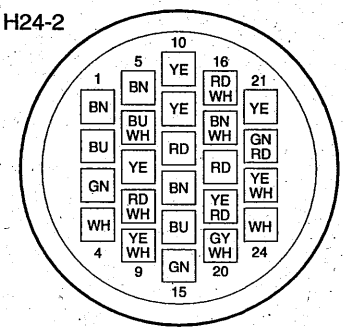
H10-25

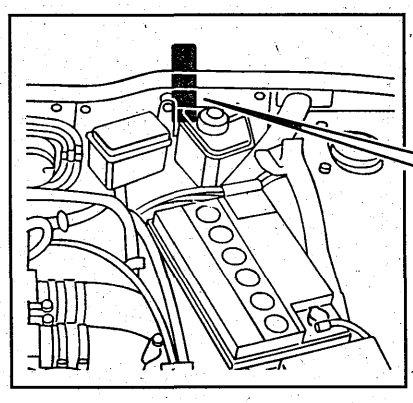
1	2	3	4	5
BU		GN	BU	GN RD
6	7	8	9	10
WH	BK			

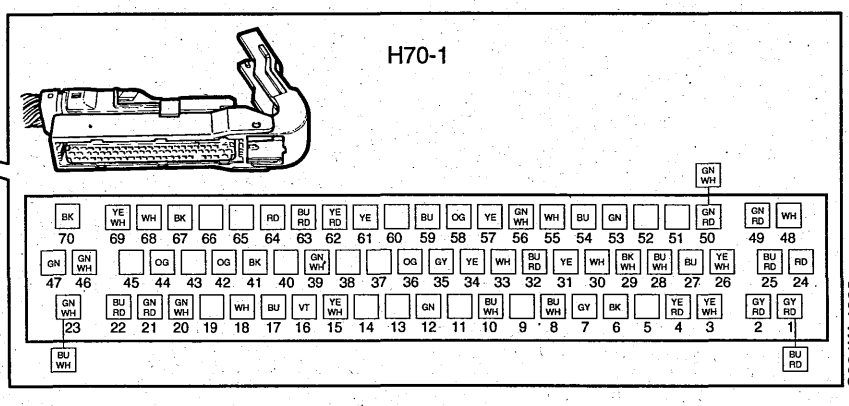




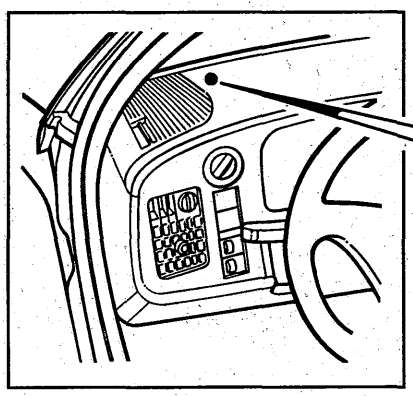
H24-2

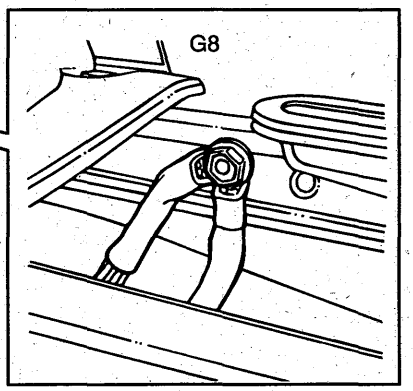


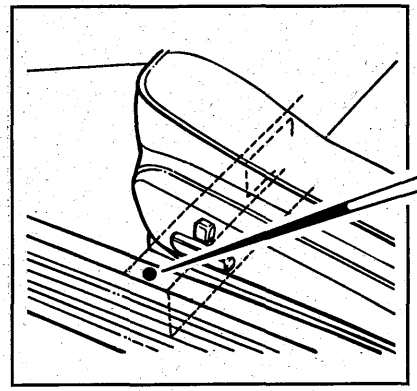


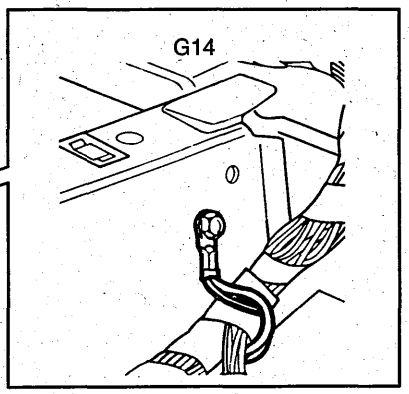


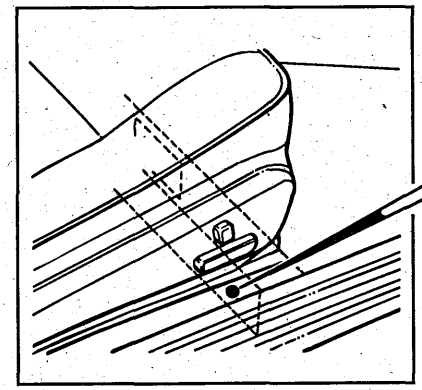
C381W-4208

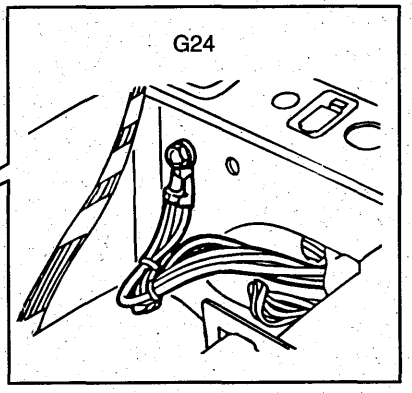


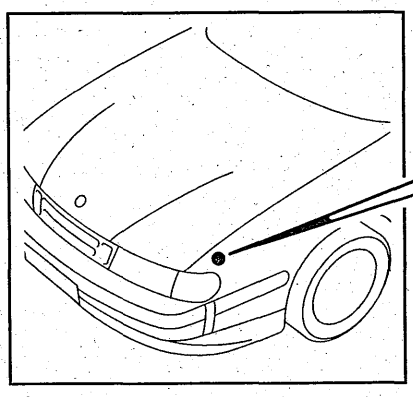


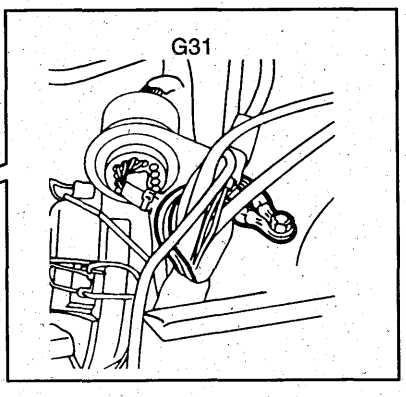










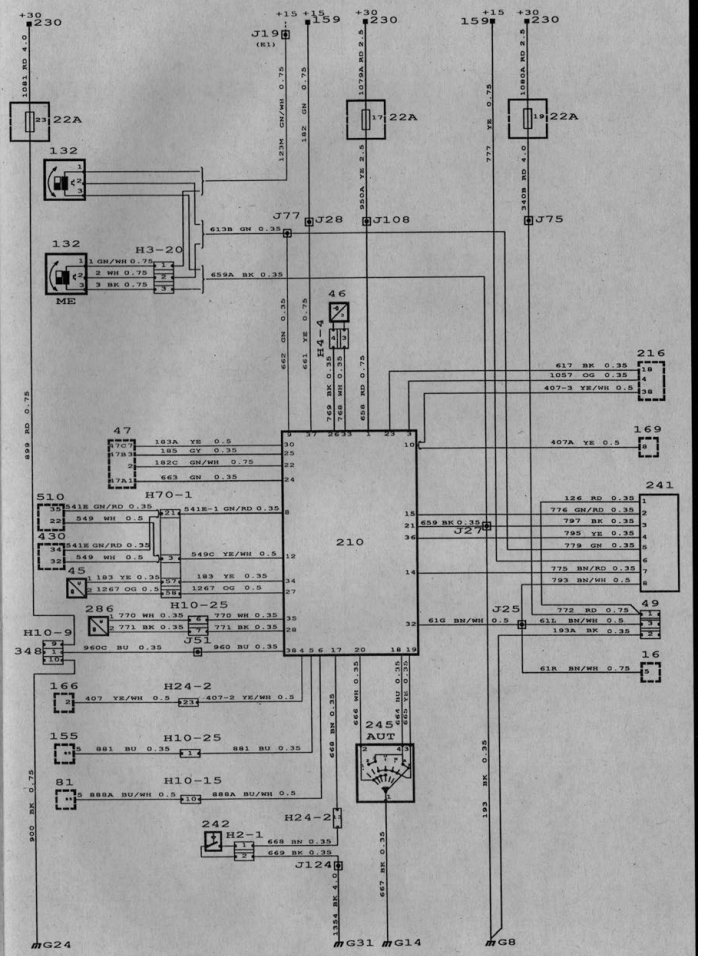


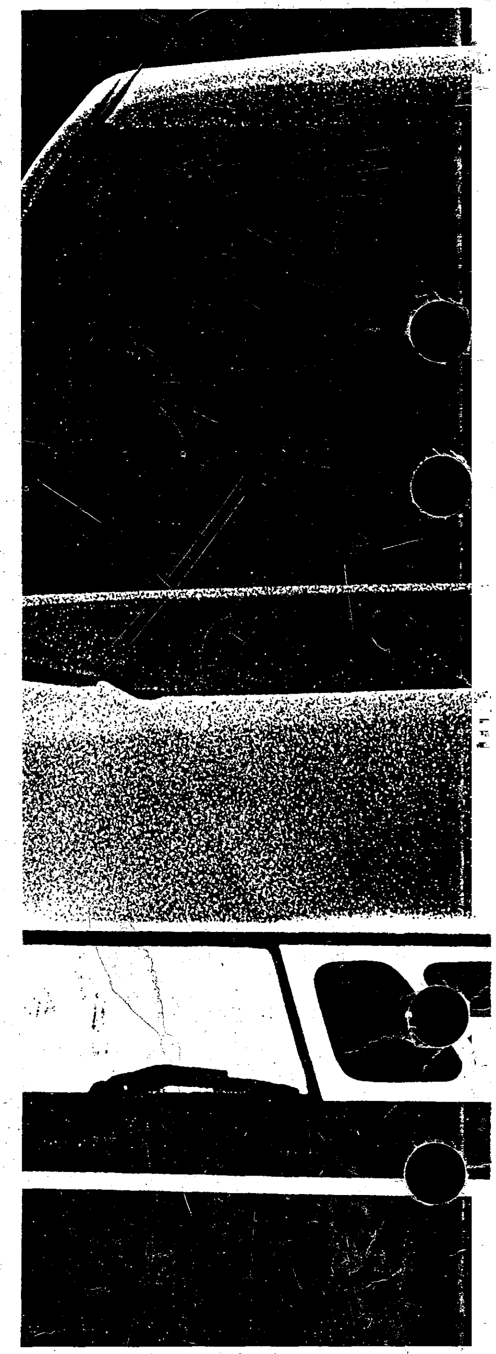
C381W-4209

Wiring diagram, EDU

List of components

16	Rheostat, instrument lighting on left-hand side of facia
22A	Fuse holder, behind flap in glove compartment
45	Coolant temperature sensor
46	Fuel level sensor in fuel tank, connectors accessible from baggage compartment
47A	Fuel level gauge in combined instrument
47B	Test lamp, fuel level, in combined instrument
47C	Coolant temperature gauge
49/241	Clock/Trip computer SCC on the right of the facia
81	Relay, 2 step radiator fan
132	Speed sensor in speedometer in combined instrument
155	Relay, radiator fan, A/C
159	Distribution terminal +15, in electrical distribution box behind glove compartment
166	Pressure switch, radiator fan, A/C and ACC
169	Switch A/C
210	EDU trip computer in combined instrument
216	Climate control unit ACC, in facia
230	Distribution terminal +30, in electrical distribution box behind glove compartment
242	Coolant level switch, in coolant expansion tank
245	Transmission range switch, automatic transmission, by the gear selector
286	Trip computer outside temperature sensor, on the left-hand side behind the front spoiler
348 (H10-9)	Data link connector for fault diagnosis on car electronics, under right-hand front seat
430	Trionic engine management system control module, on the left in the engine compartment by the windscreen wiper motor
510	Motronic engine management system control module, on the left in the engine compartment by the windscreen wiper motor
H 2-1	By the coolant expansion tank
H 3-20	Behind the combined instrument by the speedometer (ME)
H 4-4	By the fuel pump under the baggage compartment floor
H24-2	Behind the left-hand headlamp
H 70-1	Between the bulk-head partitions
G2	Grounding point, battery shelf on the left-hand wheel housing
G8	Grounding point, facia, by the left-hand front speaker point
G14	Grounding point, left-hand front seat member, under the left-hand front seat
G24	Grounding point, right-hand front seat member, under the right-hand front seat
G31	Grounding point, structural member, behind the right-hand headlamp
J19	**LHD:** Approx. 180 mm from the ignition switch and approx. 260 mm from the windshield and rear window wiper switches (Main grid) **RHD:** Approx. 260 mm from the ignition switch (Main grid)
J25	**LHD:** Approx. 460 mm from the EDU control module (Main grid) **RHD:** Approx. 315 mm from the EDU control module (Main grid)
J27	**LHD:** Approx. 360 mm from the EDU control module (Main grid) **RHD:** Approx. 280 mm from the EDU control module (Main grid)
J28	**LHD:** Approx. 310 mm from the EDU control module (Main grid) **RHD:** Approx 230 mm from the EDU control module (Main grid)
J51	Approx. 275 mm from the data link connector under the right-hand front seat
J75	**LHD:** Approx. 150 mm from the +15 terminal in the electrical distribution box in the facia (Main grid) **RHD:** Approx. 180 mm from the output on fuse 19 in the electrical distribution box in the main instrument
J77	**LHD:** Approx. 335 mm from the EDU control module (Main grid) **RHD:** Approx. 255 mm from the EDU control module (Main grid)
J108	Approx. 180 mm from the output on fuse 17 in the electrical distribution box in the facia (Main grid)





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